TEST REPORT

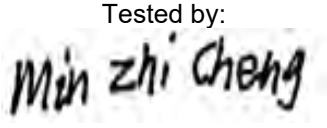
Report No.:	BCTC2502749775E
Applicant:	SHENZHEN YUNJI INTELLIGENT TECHNOLOGY CO.,LTD
Product Name:	Rugged Smart Tablet
Test Model:	RT3 Pro
Tested Date:	2025-02-14 to 2025-03-31
Issued Date:	2025-03-31

Shenzhen BCTC Testing Co., Ltd.

FCC ID: 2ANMU-RT3PRO

Product Name:	Rugged Smart Tablet
Trademark:	OUKITEL
Model/Type Reference:	RT3 Pro RT3 E, RT3 S, RT3, RT3 Plus, RT3 Ultra, RT3 GT, RT3 TITAN
Prepared For:	SHENZHEN YUNJI INTELLIGENT TECHNOLOGY CO.,LTD
Address:	A2 2F BUILDING ENET NEW INDUSTRIAL PARK, DAFU INDUSTRIAL ZONE, GUANLAN, LONGHUA, SHENZHEN, 518XXX, China
Manufacturer:	SHENZHEN YUNJI INTELLIGENT TECHNOLOGY CO.,LTD
Address:	A2 2F BUILDING ENET NEW INDUSTRIAL PARK, DAFU INDUSTRIAL ZONE, GUANLAN, LONGHUA, SHENZHEN, 518XXX, China
Prepared By:	Shenzhen BCTC Testing Co., Ltd.
Address:	1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Sample Received Date:	2025-02-14
Sample tested Date:	2025-02-14 to 2025-03-31
Issue Date:	2025-03-31
Test Standards:	IEEE Std C95.1-2019 IEEE Std 1528-2013 FCC Part 2.1093
Test Results:	PASS
Remark:	This is SAR test report

Tested by:



Min Zhi Cheng / Project Handler

Approved by:

Zero Zhou / Reviewer

Table Of Content

(Note: N/A Means Not Applicable)

1. Version

Report No.	Issue Date	Description	Approved
BCTC2502749775E	2025-03-31	Original	Valid

2. Test Standards

IEEE Std C95.1-2019: IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz. It specifies the maximum exposure limit of 1.6 W/kg as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.
IEEE Std 1528-2013: IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.
FCC Part 2.1093 Radiofrequency Radiation Exposure Evaluation: Portable DevicesKDB 447498 D01 General RF Exposure Guidance v06: Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies.
KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz.
KDB 865664 D02 RF Exposure Reporting v01r02: RF Exposure Compliance Reporting and Documentation Considerations.
KDB 248227 D01 802.11 Wi-Fi SAR v02r02: SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS.
KDB 941225 D01 3G SAR Procedures: 3G SAR MEAUREMENT PROCEDURES.
KDB 941225 D05 SAR for LTE Devices: SAR EVALUATION CONSIDERATIONS FOR LTE DEVICES.
KDB 941225 D06 Hotspot Mode v02r01: SAR EVALUATION PROCEDURES FOR PORTABLE DEVICES WITH WIRELESS ROUTER CAPABILITIES.
KDB 648474 D04 Handset SAR v01r03: SAR EVALUATION CONSIDERATIONS FOR WIRELESS HANDSETS.

3. Test Summary

The maximum results of Specific Absorption Rate (SAR) have found during testing are as follows:

Frequency Band	Report SAR_{1g} (W/kg)		SAR_{1g} Limit (W/kg)
	Body (0mm Gap)	Hotspot (0mm Gap)	
Bluetooth	0.042	/	1.6
WIFI 2.4G	0.312	0.226	1.6
WIFI 5G	0.290	0.303	1.6
GSM	1.219	0.767	1.6
WCDMA	0.963	0.802	1.6
LTE	1.201	0.974	1.6
Simultaneous Transmission	1.416	1.277	1.6

The device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-2019, and had been tested in accordance with the measurement methods and procedure specified in IEEE 1528-2013.

4. SAR Limits

FCC Limit (1g Tissue)

EXPOSURE LIMITS	SAR (W/kg)	
	General Population / Uncontrolled Exposure Environment	Occupational / Controlled Exposure Environment
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1g of tissue)	1.6	8.0
Spatial Peak (hands/wrists/feet/anklesaveraged over 10g)	4.0	20.0

Population/Uncontrolled Environments are defined as locations where there is the exposure of individual who have no knowledge or control of their exposure.
Occupational/Controlled Environments are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure (i.e. as a result of employment or occupation).

5. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is <3.75 W/kg. The expanded SAR measurement uncertainty must be ≤ 30%, for a confidence interval of k=2. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

Therefore, the measurement uncertainty is not required.

6. Product Information and Test Setup

6.1 Product Information

Model/Type reference:	RT3 Pro RT3 E, RT3 S, RT3, RT3 Plus, RT3 Ultra, RT3 GT, RT3 TITAN
Model differences:	All the model are the same circuit and RF module, except model names.
Bluetooth Version:	5.0
Hardware Version:	P593_MAIN_PCB_V1.1
Software Version:	OUKITEL_RT3_Pro_EEA_V11
Ratings:	DC 5V from adapter/DC 3.85V from battery
Adapter Information:	Model: HJ-0502000N2-US Input: 100-240V~ 50/60Hz 0.3A Output: 5.0V ⎓ 2.0A 10.0W

Bluetooth

Operation Frequency:	2402-2480MHz
Type of Modulation:	GFSK, π/ 4 DQPSK, 8DPSK
Number Of Channel	79CH
Antenna installation:	Internal antenna
Antenna Gain:	2.5 dBi Remark: ☐ The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information. ☒ The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.

BLE

Operation Frequency:	2402-2480MHz
Type of Modulation:	GFSK
Number Of Channel	40CH
Antenna installation:	Internal antenna
Antenna Gain:	2.5 dBi Remark: ☐ The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information. ☒ The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.

WIFI 2.4G

Operation Frequency:	802.11b/g/n20MHz:2412~2462 MHz 802.11n40MHz:2422~2452 MHz
Bit Rate of Transmitter	802.11b:11/5.5/2/1 Mbps 802.11g:54/48/36/24/18/12/9/6Mbps 802.11n Up to 150Mbps
Type of Modulation:	OFDM/DSSS
Number Of Channel	802.11b/g/n20MHz:11 CH 802.11n40MHz: 7 CH
Antenna installation:	Internal antenna
Antenna Gain:	2.5 dBi Remark: ☐ The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information. ☒ The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.

WIFI 5G

IEEE 802.11 WLAN Mode Supported	802.11a/n/ac(20MHz channel bandwidth) 802.11n/ac(40MHz channel bandwidth) 802.11ac(80MHz channel bandwidth)
Operation Frequency:	5180-5240MHz for 802.11a/n(HT20); 5190-5230MHz for 802.11n(HT40); 5210MHz for 802.11 ac80; 5745-5825 MHz for 802.11a/n(HT20); 5755-5795 MHz for 802.11n(HT40); 5775MHz for 802.11 ac80;
Data Rate	802.11a: 6,9,12,18,24,36,48,54Mbps; 802.11n(HT20/HT40):MCS0-MCS15; 802.11ac(VHT20): NSS1, MCS0-MCS8 802.11ac(VHT40/VHT80):NSS1, MCS0-MCS
Type of Modulation:	OFDM with BPSK/QPSK/16QAM/64QAM/256QAM for 802.11a/n/ac;
Number Of Channel	4 channels for 802.11a/n20 in the 5180-5240MHz band ; 2 channels for 802.11 n40 in the 5190-5230MHz band ; 1 channels for 802.11 ac80 in the 5210MHz band ; 5 channels for 802.11a/n20 in the 5745-5825MHz band ; 2 channels for 802.11 n40 in the 5755-5795MHz band ; 1 channels for 802.11 ac80 in the 5775MHz band
Antenna installation:	Internal antenna
Antenna Gain:	0.6 dBi Remark: ☐ The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information. ☒ The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.

2G

Operation Frequency:	GSM/GPRS/EGPRS 850: TX: 824~849MHz; RX: 869~894MHz; GSM/GPRS/EGPRS 1900: TX:1850~1910MHz; RX:1930~1990MHz; WCDMA Band II: TX: 1852.40~1907.60MHz; Rx: 1932.60~1987.40MHz; WCDMA Band IV: TX: 1712.40~1752.60MHz; RX: 2112.60 – 2452.40MHz WCDMA Band V: TX: 826.40~846.60MHz; RX: 871.40~ 891.60MHz;
GPRS Class:	Class 12
Max RF Output Power:	GSM/GPRS/EGPRS 850: 32.44 dBm, GSM/GPRS/EGPRS 1900: 29.33 dBm WCDMA Band II: 22.98 dBm WCDMA Band IV: 22.97 dBm WCDMA Band V: 22.76 dBm
Type of Modulation:	GSM with GMSK Modulation WCDMA Mode with BPSK Modulation HSDPA Mode with QPSK, 16QAM Modulation HSUPA Mode with QPSK, 16QAM Modulation
Type of Emission:	GSM/GPRS 850: 249KGXW EGPRS 850:245KG7W GSM/GPRS 1900: 248KGXW EGPRS 1900:249KG7W WCDMA Band II: 4M18F9W WCDMA Band IV: 4M20F9W WCDMA Band V: 4M18F9W
Antenna installation:	Internal antenna
Antenna Gain:	GSM850: 0.32 dBi GSM1900: -0.11 dBi WCDMA Band II: -0.16 dBi WCDMA Band IV: 2.1 dBi WCDMA Band V: 0.32 dBi

Remark:

☐ The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information.

☒ The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.

4G

Tx Frequency:	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500MHz-2570MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 17: 704MHz ~ 716MHz LTE Band 25: 1850MHz~1915MHz LTE Band 26: 814MHz ~ 824MHz 824MHz ~ 849MHz LTE Band 66: 1710MHz ~ 1780MHz
Rx Frequency:	LTE Band 2: 1930 MHz ~ 1990 MHz LTE Band 4: 2110 MHz ~ 2155 MHz LTE Band 5: 869 MHz ~ 894 MHz LTE Band 7: 2620MHz ~ 2690MHz LTE Band 12: 729 MHz ~ 746 MHz LTE Band 17: 734MHz ~ 746MHz LTE Band 25: 1930MHz~1995MHz LTE Band 26: 859MHz ~ 869MHz 869MHz ~ 894MHz LTE Band 66: 2110MHz ~ 2200MHz
Bandwidth:	LTE Band 2: 1.4MHz /3MHz /5MHz /10MHz /15MHz /20MHz LTE Band 4: 1.4MHz /3MHz /5MHz /10MHz /15MHz /20MHz LTE Band 5: 1.4MHz /3MHz /5MHz /10MHz LTE Band 7: 5MHz /10MHz /15MHz /20MHz LTE Band 12: 1.4MHz /3MHz /5MHz /10MHz LTE Band 17: 5MHz /10MHz LTE Band 25: 1.4MHz /3MHz /5MHz /10MHz /15MHz /20MHz LTE Band 26: 1.4MHz /3MHz /5MHz /10MHz 1.4MHz /3MHz /5MHz /10MHz /15MHz LTE Band 66: 1.4MHz /3MHz /5MHz /10MHz /15MHz /20MHz
The Max RF Output Power (EIRP/ERP)	LTE Band 2: 23.67 dBm LTE Band 4: 26.18 dBm LTE Band 5: 22.28 dBm LTE Band 7: 25.48 dBm LTE Band 12: 20.07 dBm LTE Band 17: 20.23 dBm LTE Band 25: 23.97 dBm LTE Band 26: 22.19 dBm 22.32 dBm LTE Band 66: 26.2 dBm
99% Occupied Bandwidth:	LTE Band 2: 18M0G7D LTE Band 4: 18M0G7D LTE Band 5: 9M00G7D LTE Band 7: 18M1W7D LTE Band 12: 9M04G7D LTE Band 17: 9M01G7D LTE Band 25: 18M0G7D LTE Band 26: 8M99W7D 13M5W7D LTE Band 66: 18M1W7D
Type of Modulation:	QPSK/16QAM
Antenna Type:	Internal Antenna
Antenna Gain:	LTE Band 2: -0.16 dBi LTE Band 4: 2.1 dBi LTE Band 5: 0.32 dBi

LTE Band 7: 1.35 dBi
LTE Band 12: -1.64 dBi
LTE Band 17: -1.64 dBi
LTE Band 25: -0.16 dBi
LTE Band 26: 0.32 dBi
LTE Band 66: 2.1 dBi
Remark:
☐ The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information.
☒ The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.

6.2 Test Setup Configuration

See test photographs attached in EUT TEST SETUP PHOTOGRAPHS for the actual connections between Product and support equipment.

6.3 Support Equipment

Cable of Product

No.	Cable Type	Quantity	Provider	Length (m)	Shielded	Note
1	--	--	Applicant	---	Yes/No	--
2	--	--	BCTC	--	Yes/No	--

No.	Device Type	Brand	Model	Series No.	Note
1.	---	---	---	---	---
2.	--	--	--	--	--

Notes:
1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

6.4 Test Environment

1. Normal Test Conditions:

Humidity(%):	35-75
Atmospheric Pressure(kPa):	95-105
Temperature(℃):	18-25

2. Extreme Test Conditions:
N/A

7. Test Facility and Test Instrument Used

7.1 Test Facility

All measurement facilities used to collect the measurement data are located at Shenzhen BCTC Testing Co., Ltd. Address: 1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

FCC Test Firm Registration Number: 712850
A2LA certificate registration number is: CN1212
ISED Registered No.: 23583
ISED CAB identifier: CN0017

7.2 Test Instrument Used

Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
PC	DELL	\	\	N/A	N/A
SAR Measurement system	SATIMO	\	\	N/A	N/A
Signal Generator	Keysight	N5182B	MY56200519	May 16, 2024	May 15, 2025
Multimeter	Keithley	1160271	\	Nov. 10, 2024	Nov 09, 2025
Network Analyzer	R&S	ZVB 8	101353	May 16, 2024	May 15, 2025
Communication Tester	R&S	CMW500	\	Nov. 11, 2024	Nov 10, 2025
E SAR PROBE 6GHz	MVG	SSE2	2623-EPGO-420	July 18, 2024	July 17, 2025
DIPOLE 750	SATIMO	SID 750	SN 47/21 DIP 0G750-620	Nov. 25, 2024	Nov. 24, 2027
DIPOLE 835	SATIMO	SID 835	SN 47/21 DIP 0G835-621	Nov. 25, 2024	Nov. 24, 2027
DIPOLE 1800	SATIMO	SID 1800	SN 47/21 DIP 1G800-623	Nov. 25, 2024	Nov. 24, 2027
DIPOLE 1900	SATIMO	SID 1900	SN 47/21 DIP 1G900-624	Nov. 25, 2024	Nov. 24, 2027
DIPOLE 2450	SATIMO	SID 2450	SN 47/21 DIP 2G450-627	Nov. 25, 2024	Nov. 24, 2027
DIPOLE 2600	SATIMO	SID 2600	SN 47/21 DIP 2G600-628	Nov. 25, 2024	Nov. 24, 2027
DIPOLE 5000	SATIMO	SID 5000	SN 47/21 DIP 5G000-629	Nov. 25, 2024	Nov. 24, 2027
COMOSAR OPENCoaxial Probe	SATIMO	\	\	Nov. 18, 2024	Nov. 17, 2025
SAR Locator	SATIMO	\	\	Nov. 18, 2024	Nov. 17, 2025
Communication Antenna	SATIMO	\	\	Nov. 18, 2024	Nov. 17, 2025
FEATURE PHONEPOSITIONING DEVICE	SATIMO	\	\	N/A	N/A
DUMMY PROBE	SATIMO	\	\	N/A	N/A
SAM Phantom	MVG	\	SN 13/09 SAM68	N/A	N/A
Liquid measurement Kit	HP	85033D	3423A08186	N/A	N/A
Power meter	Keysight	E4419	A00065	May 16, 2024	May 15, 2025
Power sensor	Keysight	E9300A	US39211659	May 16, 2024	May 15, 2025
Power sensor	Keysight	E9300A	US39211305	May 16, 2024	May 15, 2025
Directional Coupler	Krytar 158020	131467	\	N/A	N/A
Thermometer	BTE	\	\	N/A	N/A
Broad Band Tissue Simulation Liquid	Schmid	\	\	N/A	N/A

Note:
Per KDB865664D01 requirements for dipole calibration, the test laboratory has adopted three year extended calibration interval. Each measured dipole is expected to evalute with following criteria at least on annual interval.

1. There is no physical damage on the dipole;
2. System check with specific dipole is within 10% of calibrated values;
3. The most recent return-loss results, measued at least annually, deviates by no more than 20% from the previous measurement;
4. The most recent measurement of the real or imaginary parts of the impedance, measured at least annually is within 5Ω from the provious measurement.

8. Specific Absorption Rate (SAR)

8.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techiques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

8.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

$$\mathbf{SAR} = \frac{\mathbf{d}}{\mathbf{dt}}\left(\frac{\mathbf{dW}}{\mathbf{dm}}\right) = \frac{\mathbf{d}}{\mathbf{dt}}\left(\frac{\mathbf{dW}}{\boldsymbol{\rho}\mathbf{dv}}\right)$$

SAR is expressed in units of Watts per kilogram (W/kg)

SAR measurement can be either related to the temperature elevation in tissue by

$$\mathbf{SAR} = \mathbf{C}\left(\frac{\boldsymbol{\delta}\mathbf{T}}{\boldsymbol{\delta}\mathbf{t}}\right)$$

Where: C is the specific heat capacity, δ T is the temperature rise and δ t is the exposure duration, or related to the

electrical field in the tissue by

$$\mathbf{SAR} = \frac{\boldsymbol{\sigma}|\mathbf{E}|^2}{\boldsymbol{\rho}}$$

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength.

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

9. SAR Measurement System

9.1 The Measurement System

Comosar is a system that is able to determine the SAR distribution inside a phantom of human being according to different standards. The Comosar system consists of the following items:
- Main computer to control all the system
- 6 axis robot
- Data acquisition system
- Miniature E-field probe
- Phone holder
- Head simulating tissue

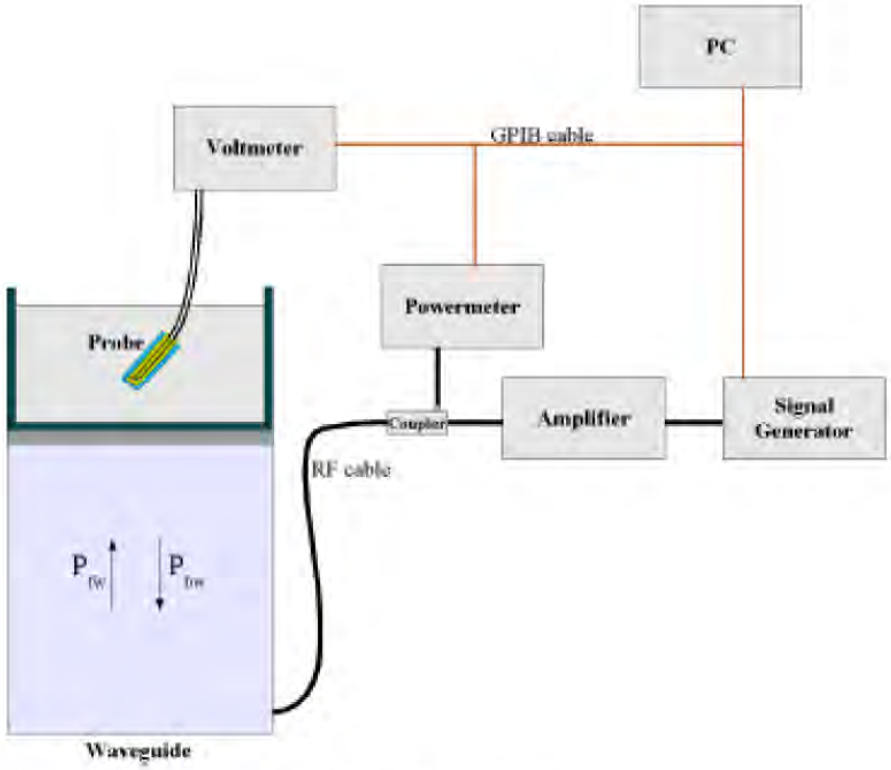
The following figure shows the system.

The EUT under test operating at the maximum power level is placed in the phone holder, under the phantom, which is filled with head simulating liquid. The E-Field probe measures the electric field inside the phantom. The OpenSAR software computes the results to give a SAR value in a 1g or 10g mass.

9.2 Probe

For the measurements the Specific Dosimetric E-Field Probe SN 46/21 EPGO362 with following specifications is used
- Dynamic range: 0.01-100 W/kg
- Tip Diameter: 5 mm
- Distance between probe tip and sensor center: 2.10mm
- Distance between sensor center and the inner phantom surface: 4 mm (repeatability better than +/- 1mm)
- Probe linearity: ＜0.25 dB
- Axial Isotropy: ＜0.25 dB
- Spherical Isotropy: ＜0.50 dB
- Calibration range: 835 to 2500MHz for head & body simulating liquid.

Angle between probe axis (evaluation axis) and surface normal line:1ess than 30°
Probe calibration is realized, in compliance with EN 62209-1 and IEEE 1528 STD, with CALISAR, Antennessa proprietary calibration system. The calibration is performed with the EN 62209-1 annex technique using reference guide at the five frequencies.



$$SAR = \frac{4(p_{\int w} - p_{Pbw})}{ab\delta} cos^2 \left(\pi \frac{y}{a}\right) c^{(2\pi/\delta)}$$

Where :
Pfw = Forward Power
Pbw = Backward Power
a and b =Waveguide dimensions
l = Skin depth

Keithley configuration:
Rate = Medium; Filter = ON; RDGS = 10; Filter type = Moving Average; Range auto after each calibration, a SAR measurement is performed on a validation dipole and compared with a NPL calibrated probe, to verify it.

The calibration factors, CF(N), for the 3 sensors corresponding to dipole 1, dipole 2 and dipole 3 are:

CF(N)=SAR(N)/Vlin(N) (N=1,2,3)

The linearised output voltage Vlin(N) is obtained from the displayed output voltage V(N) using

Vlin(N)=V(N)*(1+V(N)/DCP(N)) (N=1,2,3)

where DCP is the diode compression point in mV.

9.3 Probe Calibration Process

Dosimetric Assessment Procedure
Each E-Probe/Probe Amplifier combination has unique calibration parameters. SATIMO Probe calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm2) using an with CALISAR, Antenna proprietary calibration system.

Free Space Assessment Procedure
The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and in a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1mW/cm2.

Temperature Assessment Procedure
E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated head tissue. The E-field in the medium correlates with the temperature rise in the dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C\frac{\Delta T}{\Delta t}$$

Where:
Δt = exposure time (30 seconds),
C = heat capacity of tissue (brain or muscle),
ΔT = temperature increase due to RF exposure.

SAR is proportional to $\Delta T/\Delta t$, the initial rate of tissue heating, before thermal diffusion takes place. The electric field in the simulated tissue can be used to estimate SAR by equating the thermally derived SAR to that with the E- field component.

$$SAR = \frac{|E|^2 \cdot \sigma}{\rho}$$

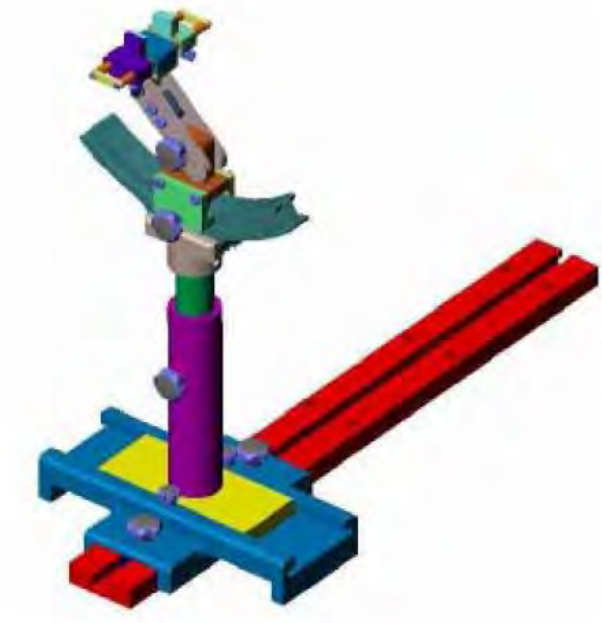
Where:
σ = simulated tissue conductivity,
ρ = Tissue density (1.25 g/cm3 for brain tissue)

9.4 Phantom

For the measurements the Specific Anthropomorphic Mannequin (SAM) defined by the IEEE SCC-34/SC2 group is used. The phantom is a polyurethane shell integrated in a wooden table. The thickness of the phantom amounts to 2mm +/- 0.2mm. It enables the dosimetric evaluation of left and right phone usage and includes an additional flat phantom part for the simplified performance check. The phantom set-up includes a cover, which prevents the evaporation of the liquid.

9.5 Device Holder

The positioning system allows obtaining cheek and tilting position with a very good accuracy. In compliance with CENELEC, the tilt angle uncertainty is lower than 1°.



System Material	Permittivity	Loss Tangent
Delrin	3.7	0.005

10. Tissue Simulating Liquids

10.1 Composition of Tissue Simulating Liquid

For the measurement of the field distribution inside the SAM phantom with SMTIMO, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. Please see the following photos for the liquid height.

Liquid Height for Body SAR

The Composition of Tissue Simulating Liquid

Frequency (MHz)	Water (%)	Salt (%)	1,2-Propane diol (%)	HEC (%)	Preventol (%)	DGBE (%)
Head/Body						
835	40.3	1.4	57.9	0.2	0.2	0
900	40.3	1.4	57.9	0.2	0.2	0
1800-2000	55.2	0.3	0	0	0	44.5
2450	55.0	0.1	0	0	0	44.9
2600	54.9	0.1	0	0	0	45.0

Frequency (MHz)	Water (%)	Hexyl Carbitol (%)	Triton X-100 (%)
Head/Body			
5000-6000	65.52	17.24	17.24

10.2 Limit

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters

computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in P1528.

Target Frequency (MHz)	Head	
	Conductivity (σ)	Permittivity (ε_r)
150	0.76	52.3
300	0.87	45.3
450	0.87	43.5
750	0.89	41.9
835	0.90	41.5
900	0.97	41.5
915	0.98	41.5
1450	1.20	40.5
1610	1.29	40.3
1800-2000	1.40	40.0
2450	1.80	39.2
2600	1.96	39.0
3000	2.40	38.5
5200	4.66	36.0
5400	4.86	35.8
5600	5.07	35.5
5800	5.27	35.3

10.3 Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using an R&S ZVB 8. Dielectric Probe Kit and an Agilent Network Analyzer.

Calibration Result for Dielectric Parameters of Tissue Simulating Liquid

Frequency (MHz)	Liquid	Target (σ)	Target (ε_r)	Measured (σ)	Measured (ε_r)	Delta (σ)%	Delta (ε_r)%	Limit (%)	Temp. TSL (°C)	Date
750	Head	0.89	41.90	0.900	40.472	1.12	-3.41	±5	23.1	18/2/2025
835	Head	0.90	41.50	0.879	43.049	-2.33	3.73	±5	22.8	25/2/2025
1800	Head	1.40	40.00	1.351	39.808	-3.50	-0.48	±5	23.5	5/3/2025
1900	Head	1.40	40.00	1.402	38.492	0.14	-3.77	±5	23.2	24/3/2025
2450	Head	1.80	39.20	1.871	37.831	3.94	-3.49	±5	23.4	25/3/2025
2600	Head	1.96	39.00	1.971	38.235	0.56	-1.96	±5	23.1	18/2/2025
5200	Head	4.66	36.00	4.476	36.592	-3.95	1.64	±5	23.4	25/3/2025
5800	Head	5.27	35.30	5.416	34.857	2.77	-1.25	±5	23.4	25/3/2025

Remark:

1. The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within ± 2°C of the temperature when the tissue parameters are characterized.
2. The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3 – 4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.

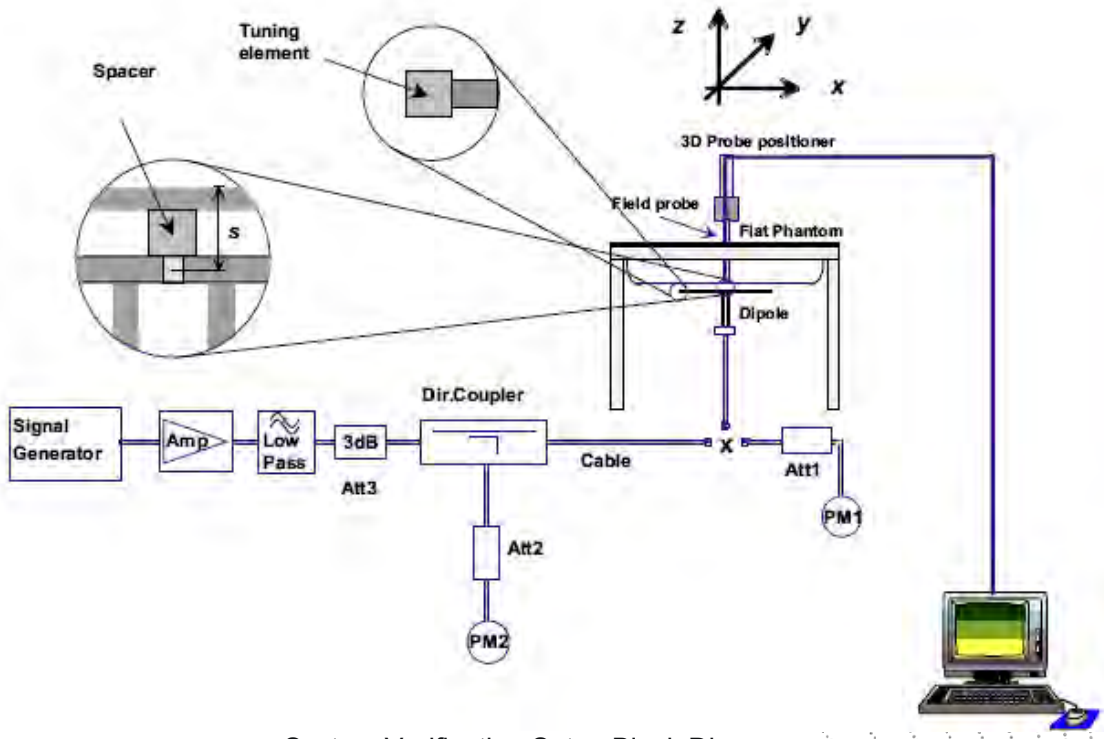
11. System Check

11.1 Purpose of System Performance Check

At the device test frequencies. System check verifies the measurement repeatability of a SAR system before compliance testing and is not a validation of all system specifications. The latter is not required for testing a device but is mandatory before the system is deployed. The system check detects possible short-term drift and unacceptable measurement errors or uncertainties in the system.

11.2 System Setup

In the simplified setup for system evaluation, the EUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave which comes from a signal generator at frequency 600MHz-6000MHz. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The output power on dipole port must be calibrated to 20 dBm (100 mW) before dipole is connected.



System Verification Setup Block Diagram

Setup Photo of Dipole Antenna

11.3 Validation Results

Comparing to the original SAR value provided by SATIMO, the validation data should be within its specification of 10 %. The following table shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion.

Frequency (MHz)	Power	Measured SAR_{1g} (W/Kg)	Normalize to 1 Watt	Drift (%)	1W Target SAR_{1g} (W/Kg)	Difference Percentage (%)	Limit (%)	Liquid Temp	Date
750	250mW	2.147	8.589	2.199	8.58	0.105	±10	22.9	18/2/2025
835	250mW	2.622	10.486	-0.822	10.01	4.755	±10	23.0	25/2/2025
1800	250mW	10.301	41.203	1.194	39.74	3.681	±10	23.3	5/3/2025
1900	250mW	10.251	41.003	-0.056	41.26	-0.623	±10	23.1	24/3/2025
2450	250mW	13.465	53.860	1.512	55.16	-2.357	±10	23.3	25/3/2025
2600	250mW	14.821	59.284	-0.762	56.50	4.927	±10	22.9	18/2/2025
5200	250mW	19.808	79.232	-1.087	76.41	3.693	±10	23.3	25/3/2025
5800	250mW	18.345	73.378	0.680	76.49	-4.069	±10	23.3	25/3/2025

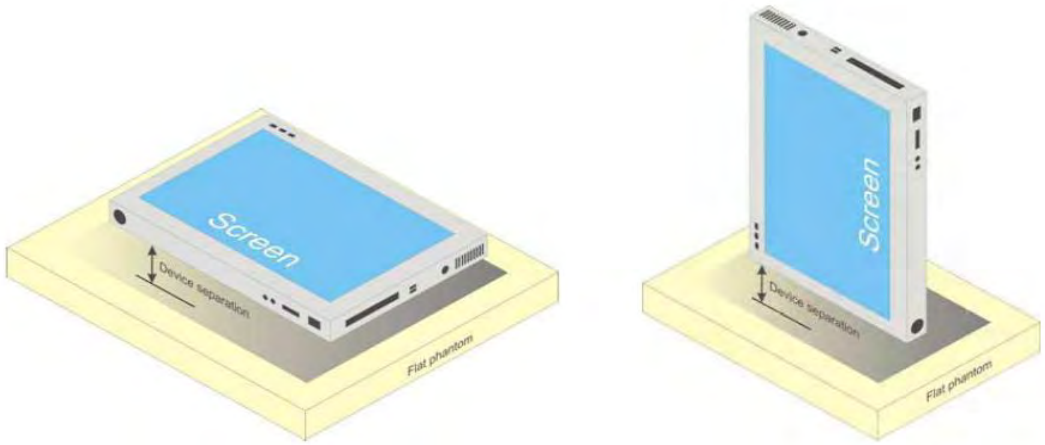
12. EUT Testing Position

Body Position

A typical example of a body supported device is a wireless enabled laptop device that among other orientations may be supported on the thighs of a sitting user. To represent this orientation, the device shall be positioned with its base against the flat phantom. Other orientations may be specified by the manufacturer in the user instructions. If the intended use is not specified, the device shall be tested directly against the flat phantom in all usable orientations.

The example shows a tablet form factor portable computer for which SAR should be separately assessed with

a). each surface and
b). the separation distances



Tablet form factor portable computer

13. SAR Measurement Procedures

13.1 Measurement Procedures

The measurement procedures are as follows:
(a) Use base station simulator (if applicable) or engineering software to transmit RF power continuously (continuous Tx) in the highest power channel.
(b) Keep EUT to radiate maximum output power or 100% factor (if applicable)
(c) Measure output power through RF cable and power meter.
(d) Place the EUT in the positions as Annex D demonstrates.
(e) Set scan area, grid size and other setting on the SATIMO software.
(f) Measure SAR results for the highest power channel on each testing position.
(g) Find out the largest SAR result on these testing positions of each band
(h) Measure SAR results for other channels in worst SAR testing position if the SAR of highest power channel is larger than 0.8 W/kg

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:
(a) Power reference measurement
(b) Area scan
(c) Zoom scan
(d) Power drift measurement

13.2 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The SATIMO software includes all numerical procedures necessary to evaluate the spatial peak SAR value.
The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.
The entire evaluation of the spatial peak values is performed within the post-processing engine. The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:
(a) Extraction of the measured data (grid and values) from the Zoom Scan
(b) Calculation of the SAR value at every measurement point based on all stored data
(c) Generation of a high-resolution mesh within the measured volume
(d) Interpolation of all measured values form the measurement grid to the high-resolution grid
(e) Extrapolation of the entire 3D field distribution to the phantom surface over the distance from sensor to surface
(f) Calculation of the averaged SAR within masses of 1g and 10g

13.3 Area & Zoom Scan Procedures

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan measures 5x5x7 points with step size 8, 8 and 5 mm for 300 MHz to 3 GHz, and 8x8x8 points with step size 4, 4 and 2.5 mm for 3 GHz to 6 GHz. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g.

<table>
<tr><td colspan="3"></td><td>≤ 3 GHz</td><td>> 3 GHz</td></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 mm ± 1 mm</td><td>½·δ·ln(2) mm ± 0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤ 2 GHz: ≤ 15 mm
2 – 3 GHz: ≤ 12 mm</td><td>3 – 4 GHz: ≤ 12 mm
4 – 6 GHz: ≤ 10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>≤ 2 GHz: ≤ 8 mm
2 – 3 GHz: ≤ 5 mm*</td><td>3 – 4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>≤ 5 mm</td><td>3 – 4 GHz: ≤ 4 mm
4 – 5 GHz: ≤ 3 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤ 4 mm</td><td>3 – 4 GHz: ≤ 3 mm
4 – 5 GHz: ≤ 2.5 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">≤ 1.5·$\Delta z_{Zoom}(n-1)$ mm</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 – 4 GHz: ≥ 28 mm
4 – 5 GHz: ≥ 25 mm
5 – 6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see IEEE Std 1528-2013 for details.
* When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB Publication 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

13.4 Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing (step-size is 4, 4 and 2.5 mm). When all volume scan were completed, the software can combine and subsequently superpose these measurement data to calculating the multiband SAR.

13.5 SAR Averaged Methods

The local SAR inside the phantom is measured using small dipole sensing elements inside a probe body. The probe tip must not be in contact with the phantom surface in order to minimize measurements errors, but the highest local SAR will occur at the surface of the phantom.

An extrapolation is using to determinate this highest local SAR values. The extrapolation is based on a fourth-order least-square polynomial fit of measured data. The local SAR value is then extrapolated from the liquid surface with a 1mm step.

The measurements have to be performed over a limited time (due to the duration of the battery) so the step of measurement is high. It could vary between 5 and 8 mm. To obtain an accurate assessment of the maximum SAR averaged over 10g and 1 g requires a very fine resolution in the three dimensional scanned data array.

13.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In SATIMO measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drift more than 5%, the SAR will be retested.

14. SAR Test Result

14.1 Conducted RF Output Power

Bluetooth			
Modulation	**Frequency (MHz)**	**Output Power (dBm)**	**Tune-up power (dBm)**
1-DH1	2402	-2.00	0.0
	2441	-0.03	
	2480	-1.16	
2-DH1	2402	-2.40	0.0
	2441	-0.45	
	2480	-1.64	
3-DH1	2402	-2.36	0.0
	2441	-0.44	
	2480	-1.63	

BLE			
Mode	**Frequency (MHz)**	**Output Power (dBm)**	**Tune-up power (dBm)**
BLE 1M	2402	-4.65	-2.5
	2440	-2.78	
	2480	-4.01	

Note:
Per KDB 447498 D01v06, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] ·[√f(GHz)] ≤ 3.0 for1-g SAR and ≤ 7.5 for 10-g extremity SAR
f(GHz) is the RF channel transmit frequency in GHz
Power and distance are rounded to the nearest mW and mm before calculation
The result is rounded to one decimal place for comparison

Turn up Power (dBm)	Turn up Power (mW)	Separation Distance (mm)	Frequency (MHz)	Result	Exclusion Thresholds
0.0	1.00	⩽5.0	2480	0.31	3.0

Per KDB 447498 D01v06, when the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.
According to the calculation results in the table above, Bluetooth SAR does not need to be tested.

NFC								
Modulation	Frequency (MHz)	Output Power (dBuV/m)	Output Power (dBm)	Tune-up (dBm)	Tune-up (mW)	Separation Distance (mm)	Result	exclusion thresholds for 1-g SAR
ASK	13.5599	54.76	-45.14	-45.0	0.00003	⩽5.0	0.00001	3.0

Note:
Per KDB 447498 D01v06, when the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.
According to the calculation results in the table above, NFC SAR does not need to be tested.

WIFI 2.4G			
Mode	**Frequency (MHz)**	**Output Power (dBm)**	**Tune-up power (dBm)**
b	2412	14.54	15.0
b	2437	14.96	
b	2462	14.99	
g	2412	13.55	14.5
g	2437	14.19	
g	2462	14.11	
n20	2412	12.43	13.5
n20	2437	13.13	
n20	2462	13.07	
n40	2422	11.78	13.0
n40	2437	12.52	
n40	2452	12.55	

WIFI 5.1G			
Mode	Frequency (MHz)	Output Power (dBm)	Tune-up power (dBm)
a	5180	**12.47**	12.5
a	5200	11.85	
a	5240	10.47	
n20	5180	11.02	11.5
n20	5200	10.37	
n20	5240	9.27	
n40	5190	9.38	9.5
n40	5230	8.20	
ac20	5180	11.04	11.5
ac20	5200	10.60	
ac20	5240	9.43	
ac40	5190	9.51	10.0
ac40	5230	8.38	
ac80	5210	7.78	8.0

WIFI 5.8G			
Mode	Frequency (MHz)	Output Power (dBm)	Tune-up power (dBm)
a	5745	**11.85**	12.0
a	5785	11.14	
a	5825	10.52	
n20	5745	10.56	11.0
n20	5785	9.88	
n20	5825	9.43	
n40	5755	9.81	10.0
n40	5795	8.70	
ac20	5745	10.90	11.0
ac20	5785	9.95	
ac20	5825	9.39	
ac40	5755	9.75	10.0
ac40	5795	8.81	
ac80	5775	8.31	8.5

GSM - Burst Average Power (dBm)								
Band	**GSM850**			**Tune-up**	**GSM1900**			**Tune-up**
Channel	**128**	**190**	**251**		**512**	**661**	**810**	
Frequency (MHz)	**824.2**	**836.6**	**848.8**		**1850.2**	**1880**	**1909.8**	
GSM	32.16	**32.44**	32.41	32.5	**29.33**	29.30	28.93	29.5
GPRS Slot -1	32.11	32.44	32.38	32.5	29.31	29.27	28.89	29.5
GPRS Slot -2	31.41	31.66	31.67	32.0	28.27	28.31	27.98	28.5
GPRS Slot -3	29.63	29.88	29.93	30.0	26.41	26.50	26.28	27.0
GPRS Slot -4	28.51	28.76	28.84	29.0	25.55	25.63	25.41	26.0
EGPRS Slot -1	23.35	23.37	23.46	23.5	24.44	24.91	24.61	25.0
EGPRS Slot -2	21.97	21.70	21.71	22.0	23.36	23.27	22.94	23.5
EGPRS Slot -3	19.84	19.67	19.94	20.0	20.99	21.12	21.10	21.5
EGPRS Slot -4	18.83	18.79	18.77	19.0	19.72	19.53	19.28	20.0

GSM - Source-Based Time-Average Power (dBm)						
Band	**GSM850**			**GSM1900**		
Channel	**128**	**190**	**251**	**512**	**661**	**810**
Frequency (MHz)	**824.2**	**836.6**	**848.8**	**1850.2**	**1880**	**1909.8**
GSM	23.16	23.44	23.41	20.33	20.30	19.93
GPRS Slot -1	23.11	23.44	23.38	20.31	20.27	19.89
GPRS Slot -2	25.41	25.66	25.67	22.27	22.31	21.98
GPRS Slot -3	25.38	25.63	25.68	22.16	22.25	22.03
GPRS Slot -4	25.51	25.76	**25.84**	22.55	**22.63**	22.41
EGPRS Slot -1	14.35	14.37	14.46	15.44	15.91	15.61
EGPRS Slot -2	15.97	15.70	15.71	17.36	17.27	16.94
EGPRS Slot -3	15.59	15.42	15.69	16.74	16.87	16.85
EGPRS Slot -4	15.83	15.79	15.77	16.72	16.53	16.28

Notes:
1. Division Factors
To average the power, the division factor is as follows:
1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.00dB
2TX-slot = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.00dB
3TX-slot = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB
4TX-slot = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.00dB
.

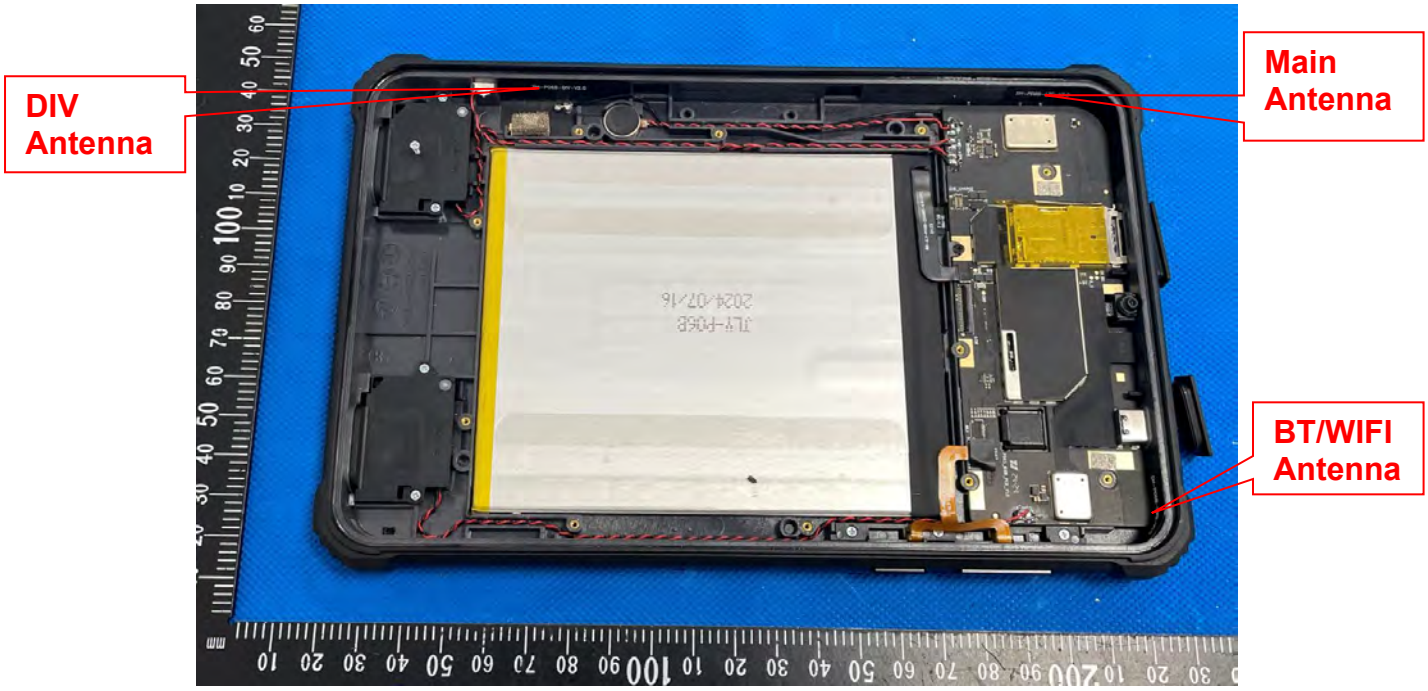
Band	WCDMA Band II				WCDMA Band IV			
Channel	9262	9400	9538	Tune-up (dBm)	1312	1450	1513	Tune-up (dBm)
Frequency (MHz)	1852.4	1880.0	1907.6		1712.4	1740	1752.6	
WCDMA RMC 12.2K	22.85	**22.98**	22.82	23.0	**22.97**	22.89	22.97	23.0
HSDPA Subtest-1	21.88	21.99	21.84	22.0	22.12	21.97	22.03	22.5
HSDPA Subtest-2	21.45	21.47	21.34		21.50	21.37	21.62	
HSDPA Subtest-3	20.15	20.48	20.34		20.60	20.30	20.24	
HSDPA Subtest-4	20.56	20.20	20.16		20.34	20.67	20.30	
HSUPA Subtest-1	20.64	21.82	21.61	22.0	20.76	21.72	21.74	22.0
HSUPA Subtest-2	21.77	21.88	21.62		22.02	21.78	21.92	
HSUPA Subtest-3	20.11	20.67	20.50		20.44	20.75	20.46	
HSUPA Subtest-4	21.89	21.98	21.78		22.07	21.94	22.00	
HSUPA Subtest-5	20.28	21.31	21.25		20.61	21.12	21.30	

Band	WCDMA Band V							
Channel	4132	4182	4233	Tune-up (dBm)				
Frequency (MHz)	826.4	836.4	846.6					
WCDMA RMC 12.2K	22.71	22.75	**22.76**	23.0				
HSDPA Subtest-1	21.70	21.79	21.83	22.0				
HSDPA Subtest-2	21.33	21.27	21.33					
HSDPA Subtest-3	20.11	20.03	20.17					
HSDPA Subtest-4	20.29	20.28	20.49					
HSUPA Subtest-1	20.42	21.57	21.58	22.0				
HSUPA Subtest-2	21.62	21.72	21.70					
HSUPA Subtest-3	19.74	20.49	20.59					
HSUPA Subtest-4	21.71	21.82	21.80					
HSUPA Subtest-5	20.45	21.07	21.03					

See Appendix 1 for RF conduction data for LTE.

14.2 Transmit Antennas and SAR Measurement Position

EUT Antenna Location:



Antennas	Support Band
Main	GSM 850/1900 + WCDMA Band 2/4/5 + LTE Band 2/4/5/7/12/17/25/26/66 TX
DIV	GSM 850/1900 + WCDMA Band 2/4/5 + LTE Band 2/4/5/7/12/17/25/26/66 RX
BT/WIFI	Bluetooth + WIFI 2.4G + WIFI 5G

Distance of The Antenna to the EUT surface and edge (mm)						
Antennas	**Front**	**Back**	**Top Side**	**Bottom Side**	**Left Side**	**Right Side**
Main	<25	<25	120	<25	<25	186
BT/WIFI	<25	<25	<25	118	<25	186

Body mode: Positions for SAR tests						
Antennas	**Front**	**Back**	**Top Side**	**Bottom Side**	**Left Side**	**Right Side**
Main	Yes	Yes	No	Yes	Yes	No
BT/WIFI	Yes	Yes	Yes	No	Yes	No

14.3 Measured and Reported (Scaled) SAR Results

The calculated SAR is obtained by the following formula:

1. Reported SAR for WWAN=Measured SAR * Tune-up Scaling factor
2. Reported SAR for WLAN and Bluetooth=Measured SAR * Tune-up Scaling factor * Duty Cycle Scaling factor
3. Duty Cycle Scaling factor=1/ Duty Cycle (%)

KDB 447498 D01 General RF Exposure Guidance:

Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:

- ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
- ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
- ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz

KDB 648474 D04 Handset SAR v01r03:

1. When the *reported* SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest *reported* SAR configuration for that wireless mode and frequency band should be repeated for the body-worn accessory with a headset attached to the handset.
2. when the separation distance required for body-worn accessory testing is larger than or equal to that tested for hotspot mode, using the same wireless mode test configuration for voice and data, such as UMTS, LTE and Wi-Fi, and for the same surface of the phone, the hotspot mode SAR data may be used to support body-worn accessory SAR compliance for that particular configuration (surface)
3. For Smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm, when hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.

KDB 941225 D01 3G SAR Procedures:

When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤1/4dB higher than the primary mode (RMC12.2kbps) or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.

KDB 941225 D05 SAR for LTE Devices:

1. Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB, and 50% RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel.
2. When the reported SAR is > 0.8 W/kg, testing for other Channels is performed at the highest output power level for 1RB, and 50% RB configuration for that channel.
3. Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High Channel when the highest reported SAR for 1 RB and 50% RB are > 0.8 W/kg. Testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation < 1.45 W/kg.
4. SAR measurement is not required for the 16QAM and 64QAM. When the highest maximum output power for 16QAM and 64QAM is ≤ ½ dB higher than the QPSK or when the reported SAR for the QPSK configuration is ≤ 1.45 W/kg.
5. Testing for the other channel bandwidths is not required because the reported SAR for the highest channel bandwidth is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.

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SAR test reduction for 802.11 Wi-Fi transmission mode configurations are considered separately for DSSS and OFDM. An initial test position is determined to reduce the number of tests required for certain exposure configurations with multiple test positions. An initial test configuration is determined for each frequency band and aggregated band according to maximum output power, channel bandwidth, wireless mode configurations and other operating parameters to streamline the measurement requirements.

For 2.4 GHz 802.11b DSSS, either the initial test position procedure for multiple exposure test positions or the DSSS procedure for fixed exposure position is applied; these are mutually exclusive. For 2.4 GHz and 5 GHz OFDM configurations, the initial test configuration is applied to measure SAR using either the initial test position procedure for multiple exposure test position configurations or the initial test configuration procedures for fixed exposure test conditions.

DSSS and OFDM configurations are considered separately according to the required SAR procedures. SAR is measured in the initial test position using the 802.11 transmission mode configuration required by the DSSS procedure or initial test configuration and subsequent test configuration(s) according to the OFDM procedures.16 The initial test position procedure is described in the following:

a) When the *reported* SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other (remaining) test positions in that exposure configuration and 802.11 transmission mode combinations within the frequency band or aggregated band. SAR is also not required for that exposure configuration in the subsequent test configuration(s).

b) When the *reported* SAR of the initial test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position using subsequent highest extrapolated or estimated 1-g SAR conditions determined by area scans or next closest/smallest test separation distance and maximum RF coupling test positions based on manufacturer justification, on the highest maximum output power channel, until the *reported* SAR is ≤ 0.8 W/kg or all required test positions (left, right, touch, tilt or subsequent surfaces and edges) are tested.

c) For all positions/configurations tested using the initial test position and subsequent test positions, when the *reported* SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the *reported* SAR is ≤ 1.2 W/kg or all required channels are tested.

Additional power measurements may be required for this step, which should be limited to those necessary for identifying the subsequent highest output power channels.

When the specified maximum output power is the same for both UNII 1 and UNII 2A, begin SAR measurements in UNII 2A with the channel with the highest measured output power. If the reported SAR for UNII 2A is ≤ 1.2 W/kg, SAR is not required for UNII 1; otherwise treat the remaining bands separately and test them independently for SAR.

When the specified maximum output power is different between UNII 1 and UNII 2A, begin SAR with the band that has the higher specified maximum output. If the highest reported SAR for the band with the highest specified power is ≤ 1.2 W/kg, testing for the band with the lower specified output power is not required; otherwise test the remaining bands independently for SAR

WIFI 2.4G								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Body & Hotspot	802.11b	Front Face	2462	14.99	15.0	0.197	0.197	
		Back Face	2462	14.99	15.0	0.311	**0.312**	**1**
Hotspot	802.11b	Left Side	2462	14.99	15.0	0.225	0.226	
		Bottom Side	2462	14.99	15.0	0.099	0.099	

WIFI 5.1G								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Body & Hotspot	802.11a	Front Face	5180	12.47	12.5	0.125	0.126	
		Back Face	5180	12.47	12.5	0.288	**0.290**	**2**
Hotspot	802.11a	Left Side	5180	12.47	12.5	0.230	0.232	
		Bottom Side	5180	12.47	12.5	0.272	0.274	

WIFI 5.8G								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Body & Hotspot	802.11a	Front Face	5745	11.85	12.0	0.171	0.177	
		Back Face	5745	11.85	12.0	0.246	0.255	
Hotspot	802.11a	Left Side	5745	11.85	12.0	0.293	**0.303**	**3**
		Bottom Side	5745	11.85	12.0	0.263	0.272	

GSM 850								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Body & Hotspot	GSM	Front Face	836.6	32.44	32.5	0.710	0.720	
		Back Face	836.6	32.44	32.5	0.247	0.250	
	GPRS Slot-4	Front Face	848.8	28.84	29.0	1.057	1.097	
		Back Face	848.8	28.84	29.0	0.609	0.632	
		Front Face	824.2	28.51	29.0	1.030	1.153	
		Front Face	836.6	28.76	29.0	1.120	**1.184**	**4**
Hotspot	GPRS Slot-4	Left Side	848.8	28.84	29.0	0.513	0.532	
		Bottom Side	848.8	28.84	29.0	0.683	0.709	

GSM 1900								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Body & Hotspot	GSM	Front Face	1850.2	29.77	30.0	0.049	0.052	
		Back Face	1850.2	29.77	30.0	0.116	0.122	
	GPRS Slot-4	Front Face	1880	25.63	26.0	1.078	1.174	
		Back Face	1880	25.63	26.0	0.784	0.854	
		Front Face	1850.2	25.55	26.0	1.099	**1.219**	**5**
		Front Face	1909.8	25.41	26.0	1.004	1.150	
Hotspot	GPRS Slot-4	Left Side	1880	25.63	26.0	0.669	0.728	
		Bottom Side	1880	25.63	26.0	0.704	0.767	

WCDMA Band 2								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Body & Hotspot	RMC	Front Face	1880	22.98	23.0	0.959	**0.963**	**6**
		Back Face	1880	22.98	23.0	0.704	0.707	
		Front Face	1852.4	22.85	23.0	0.875	0.906	
		Front Face	1707.6	22.82	23.0	0.815	0.849	
Hotspot	RMC	Left Side	1880	22.98	23.0	0.648	0.651	
		Bottom Side	1880	22.98	23.0	0.798	0.802	

WCDMA Band 4								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Body & Hotspot	RMC	Front Face	1712.4	22.97	23.0	0.611	**0.615**	**7**
		Back Face	1712.4	22.97	23.0	0.429	0.432	
Hotspot	RMC	Left Side	1712.4	22.97	23.0	0.466	0.469	
		Bottom Side	1712.4	22.97	23.0	0.459	0.462	

WCDMA Band 5								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Body & Hotspot	RMC	Front Face	846.6	22.76	23.0	0.629	**0.665**	**8**
		Back Face	846.6	22.76	23.0	0.537	0.568	
Hotspot	RMC	Left Side	846.6	22.76	23.0	0.574	0.607	
		Bottom Side	846.6	22.76	23.0	0.531	0.561	

LTE Band 2 (20MHz Bandwidth)								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Body & Hotspot	QPSK, 1RB	Front Face	1860	23.10	23.5	0.985	1.080	
		Back Face	1860	23.10	23.5	0.781	0.856	
		Front Face	1880	22.88	23.5	0.948	1.093	
		Front Face	1900	22.76	23.5	0.960	**1.138**	**9**
	QPSK, 50%RB	Front Face	1900	22.32	22.5	0.798	0.832	
		Back Face	1900	22.32	22.5	0.706	0.736	
Body	QPSK, 1RB	Left Side	1860	23.10	23.5	0.714	0.783	
		Bottom Side	1860	23.10	23.5	0.643	0.705	
	QPSK, 50%RB	Left Side	1900	22.32	22.5	0.665	0.693	
		Bottom Side	1900	22.32	22.5	0.519	0.541	

LTE Band 4 (20MHz Bandwidth)								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Body & Hotspot	QPSK, 1RB	Front Face	1745	23.38	23.5	1.116	1.147	
		Back Face	1745	23.38	23.5	0.757	0.778	
		Front Face	1720	23.29	23.5	1.121	**1.177**	**10**
		Front Face	1732.5	23.34	23.5	1.002	1.040	
	QPSK, 50%RB	Front Face	1720	22.81	23.0	0.948	0.990	
		Back Face	1720	22.81	23.0	0.617	0.645	
		Front Face	1732.5	22.67	23.0	0.985	1.063	
		Front Face	1745	22.64	23.0	1.053	1.144	
	QPSK, 100%RB	Front Face	1720	22.77	23.0	0.932	0.983	
Body	QPSK, 1RB	Left Side	1745	23.38	23.5	0.376	0.387	
		Bottom Side	1745	23.38	23.5	0.483	0.497	
	QPSK, 50%RB	Left Side	1720	22.81	23.0	0.291	0.304	
		Bottom Side	1720	22.81	23.0	0.322	0.336	

LTE Band 5 (10MHz Bandwidth)								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Body & Hotspot	QPSK, 1RB	Front Face	829	23.88	24.0	0.586	**0.602**	**11**
		Back Face	829	23.88	24.0	0.228	0.234	
	QPSK, 50%RB	Front Face	844	22.79	23.0	0.458	0.481	
		Back Face	844	22.79	23.0	0.179	0.188	
Body	QPSK, 1RB	Left Side	829	23.88	24.0	0.223	0.229	
		Bottom Side	829	23.88	24.0	0.341	0.351	
	QPSK, 50%RB	Left Side	844	22.79	23.0	0.182	0.191	
		Bottom Side	844	22.79	23.0	0.222	0.233	

LTE Band 7 (20MHz Bandwidth)								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Body & Hotspot	QPSK, 1RB	Front Face	2510	23.32	23.5	0.598	0.623	
		Back Face	2510	23.32	23.5	0.779	0.812	
	QPSK, 50%RB	Front Face	2560	22.75	23.0	0.692	0.733	
		Back Face	2560	22.75	23.0	0.711	0.753	
Body	QPSK, 1RB	Left Side	2510	23.32	23.5	0.868	0.905	
		Bottom Side	2510	23.32	23.5	0.331	0.345	
		Left Side	2535	22.60	23.5	0.792	**0.974**	**12**
		Left Side	2560	23.10	23.5	0.714	0.783	
	QPSK, 50%RB	Left Side	2560	22.75	23.0	0.768	0.814	
		Bottom Side	2560	22.75	23.0	0.198	0.210	

LTE Band 12 (10MHz Bandwidth)								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Body & Hotspot	QPSK, 1RB	Front Face	711	23.64	24.0	0.953	**1.035**	**13**
		Back Face	711	23.64	24.0	0.479	0.520	
		Back Face	704	23.51	24.0	0.862	0.965	
		Back Face	707.5	23.58	24.0	0.858	0.945	
	QPSK, 50%RB	Front Face	707.5	22.75	23.0	0.882	0.934	
		Back Face	707.5	22.75	23.0	0.325	0.344	
		Back Face	704	22.54	23.0	0.811	0.902	
		Back Face	711	22.59	23.0	0.798	0.877	
	QPSK, 100%RB	Back Face	711	22.73	23.0	0.823	0.876	
Body	QPSK, 1RB	Left Side	711	23.64	24.0	0.489	0.531	
		Bottom Side	711	23.64	24.0	0.655	0.712	
	QPSK, 50%RB	Left Side	707.5	22.75	23.0	0.314	0.333	
		Bottom Side	707.5	22.75	23.0	0.501	0.531	

LTE Band 17 (10MHz Bandwidth)								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Body & Hotspot	QPSK, 1RB	Front Face	711	23.86	24.0	1.117	1.154	
		Back Face	711	23.86	24.0	0.528	0.545	
		Front Face	709	23.78	24.0	1.131	**1.190**	**14**
		Front Face	710	23.79	24.0	1.128	1.184	
	QPSK, 50%RB	Front Face	709	23.04	23.5	0.869	0.966	
		Back Face	709	23.04	23.5	0.411	0.457	
		Front Face	710	22.96	23.5	0.799	0.905	
		Front Face	711	22.80	23.5	0.885	1.040	
	QPSK, 100%RB	Front Face	709	22.89	23.0	0.728	0.747	
Body	QPSK, 1RB	Left Side	711	23.86	24.0	0.553	0.571	
		Bottom Side	711	23.86	24.0	0.560	0.578	
	QPSK, 50%RB	Left Side	709	23.04	23.5	0.399	0.444	
		Bottom Side	709	23.04	23.5	0.366	0.407	

LTE Band 25 (20MHz Bandwidth)								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Body & Hotspot	QPSK, 1RB	Front Face	1882.5	23.84	24.0	0.974	1.011	
		Back Face	1882.5	23.84	24.0	0.823	0.854	
		Front Face	1860	22.53	24.0	0.856	**1.201**	**15**
		Front Face	1905	23.77	24.0	0.968	1.021	
	QPSK, 50%RB	Front Face	1882.5	22.71	23.0	0.782	0.836	
		Back Face	1882.5	22.71	23.0	0.689	0.737	
Body	QPSK, 1RB	Left Side	1882.5	23.84	24.0	0.598	0.620	
		Bottom Side	1882.5	23.84	24.0	0.641	0.665	
	QPSK, 50%RB	Left Side	1882.5	22.71	23.0	0.477	0.510	
		Bottom Side	1882.5	22.71	23.0	0.428	0.458	

LTE Band 26 (10MHz Bandwidth)								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Body & Hotspot	QPSK, 1RB	Front Face	819	23.78	24.0	0.822	**0.865**	**16**
		Back Face	819	23.78	24.0	0.280	0.295	
	QPSK, 50%RB	Front Face	819	22.72	23.0	0.776	0.828	
		Back Face	819	22.72	23.0	0.211	0.225	
Body	QPSK, 1RB	Left Side	819	23.78	24.0	0.287	0.302	
		Bottom Side	819	23.78	24.0	0.393	0.413	
	QPSK, 50%RB	Left Side	819	22.72	23.0	0.168	0.179	
		Bottom Side	819	22.72	23.0	0.218	0.233	

LTE Band 26 (15MHz Bandwidth)								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Body & Hotspot	QPSK, 1RB	Front Face	836.5	24.04	24.5	0.683	**0.759**	**17**
		Back Face	836.5	24.04	24.5	0.304	0.338	
	QPSK, 50%RB	Front Face	836.5	22.82	23.0	0.523	0.545	
		Back Face	836.5	22.82	23.0	0.198	0.206	
Body	QPSK, 1RB	Left Side	836.5	24.04	24.5	0.330	0.367	
		Bottom Side	836.5	24.04	24.5	0.382	0.425	
	QPSK, 50%RB	Left Side	836.5	22.82	23.0	0.218	0.227	
		Bottom Side	836.5	22.82	23.0	0.306	0.319	

LTE Band 66 (20MHz Bandwidth)								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR1g (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Body & Hotspot	QPSK, 1RB	Front Face	1770	23.54	24.0	0.997	1.108	
		Back Face	1770	23.54	24.0	0.889	0.988	
		Front Face	1720	23.31	24.0	0.855	1.002	
		Front Face	1745	23.20	24.0	0.929	**1.117**	**18**
	QPSK, 50%RB	Front Face	1720	22.67	23.0	0.865	0.933	
		Back Face	1720	22.67	23.0	0.701	0.756	
		Front Face	1745	22.53	23.0	0.825	0.919	
		Front Face	1770	22.50	23.0	0.816	0.916	
	QPSK, 100%RB	Front Face	1720	22.61	23.0	0.743	0.813	
Body	QPSK, 1RB	Left Side	1770	23.54	24.0	0.569	0.633	
		Bottom Side	1770	23.54	24.0	0.610	0.678	
	QPSK, 50%RB	Left Side	1720	22.67	23.0	0.412	0.445	
		Bottom Side	1720	22.67	23.0	0.436	0.470	

14.4 SAR Measurement Variability

According to KDB865664, Repeated measurements are required only when the measured SAR is ≥ 0.80 W/kg. If the measured SAR value of the initial repeated measurement is < 1.45 W/kg with ≤ 20% variation, only one repeated measurement is required to reaffirm that the results are not expected to have substantial variations, which may introduce significant compliance concerns. A second repeated measurement is required only if the measured result for the initial repeated measurement is within 10% of the SAR limit and vary by more than 20%, which are often related to device and measurement setup difficulties. The following procedures are applied to determine if repeated measurements are required. The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.19 The repeated measurement results must be clearly identified in the SAR report. All measured SAR, including the repeated results, must be considered to determine compliance and for reporting according to KDB 690783.Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.

1) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
2) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
3) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.
4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20

Test Mode	Frequency (MHz)	RF Exposure Configuration	Test Position	Repeated SAR (yes/no)	Highest Measured SAR1-g (W/Kg)	First Repeated	
						Measured SAR1-g (W/Kg)	Largest to Smallest SAR Ratio
GSM 850	836.6	Body&Hotspot	Front	yes	1.120	1.101	1.017
GSM 1900	1850.2	Body&Hotspot	Front	yes	1.099	1.050	1.047
WCDMA Band 2	1880	Body&Hotspot	Front	yes	0.959	0.918	1.045
LTE Band 2	1860	Body&Hotspot	Front	yes	0.985	0.944	1.043
LTE Band 4	1720	Body&Hotspot	Front	yes	1.121	1.096	1.023
LTE Band 7	2510	Body	Left Side	yes	0.868	0.833	1.042
LTE Band 12	711	Body&Hotspot	Front	yes	0.953	0.940	1.014
LTE Band 17	709	Body&Hotspot	Front	yes	1.131	1.117	1.013
LTE Band 25	1882.5	Body&Hotspot	Front	yes	0.974	0.963	1.011
LTE Band 26	819	Body&Hotspot	Front	yes	0.822	0.810	1.015
LTE Band 66	1770	Body&Hotspot	Front	yes	0.997	0.973	1.025

14.5 Simultaneous Transmission Evaluation

Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneous transmiting antenna.

Application Simultaneous Transmission information:

No.	Configurations	Body SAR
1	WWAN + WIFI	Yes
2	WWAN + Bluetooth	Yes
3	WIFI 2.4G + WIFI 5G	No
4	WIFI + Bluetooth	No

Remark:

1. Wi-Fi 2.4GHz and Wi-Fi 5GHz cannot transmit simultaneously.
2. WIFI2.4G and Bluetooth are the same antenna and cannot be sent at the same time.
3. According to the KDB 447498 D01 v06, when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

● (max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[√f(GHz)/x] W/kg for test separation distances ≤ 50 mm;
where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.
● 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is > 50 mm

Estimated stand alone SAR					
Mode	**Maximum Power (dBm)**	**Maximum Power (mW)**	**Separation Distance (mm)**	**X**	**Estimated SAR1-g (W/kg)**
Bluetooth	0.0	1.00	5	3.0	0.042

Note:

1. Maximum average power including tune-up tolerance;
2. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

4. Per FCC KD B447498 D01, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the transmitting antenna in a specific a physical test configuration is ≤1.6 W/Kg. When the sum is greater than the SAR limit, SAR test exclusion is determined by the SAR to peak location separation ratio.

$$\text{Ratio}=\frac{(SAR_1+SAR_2)^{1.5}}{(\text{peak location separation,mm})}<0.04$$

5. Simultaneous transmission of maximum SAR sum calculation.

RF Exposure Conditions	Test Position	Standalone SAR (W/kg)		Summed SAR (W/kg)	SAR1-g Limit (W/kg)
		Main	BT/WIFI		
Body & Hotspot	Front	1.219	0.197	**1.416**	1.6
	Back	0.988	0.312	1.300	
Body	Left Side	0.974	0.303	**1.277**	
	Right Side	/	/	/	
	Top Side	/	0.274	0.274	
	Bottom Side	0.802	/	0.802	

15. Test Plots

15.1 System Performance Check

System check at 750 MHz
Date of measurement: 18/2/2025

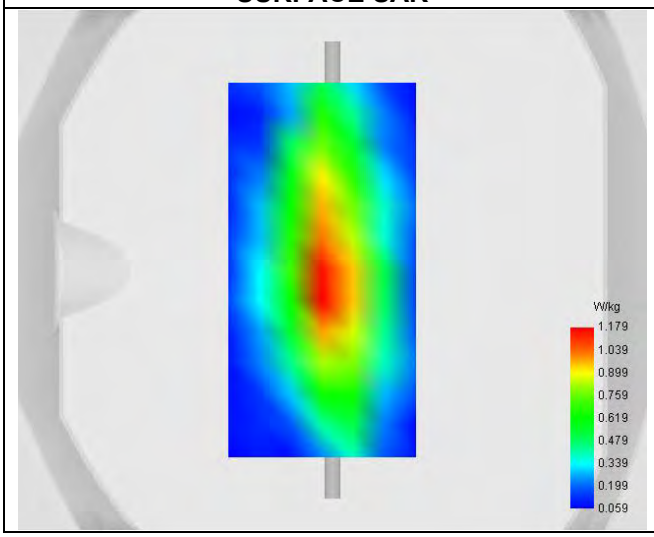
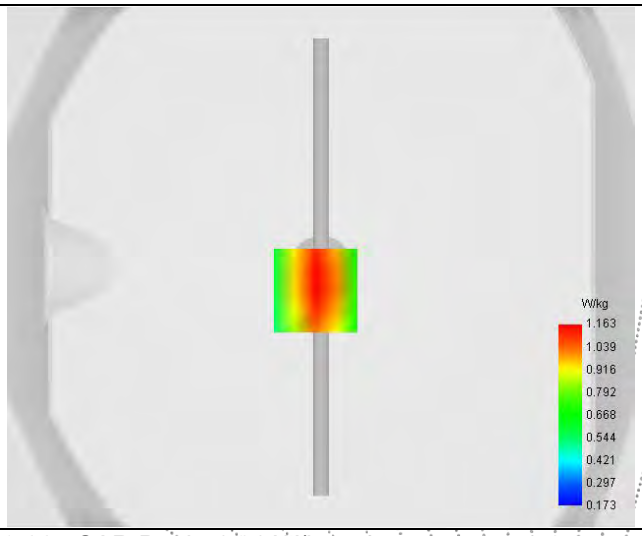
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.87
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW750
Signal	CW

B. Permitivity

Frequency (MHz)	750.000
Relative permitivity (real part)	40.472
Relative permitivity (imaginary part)	24.595
Conductivity (S/m)	0.900

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

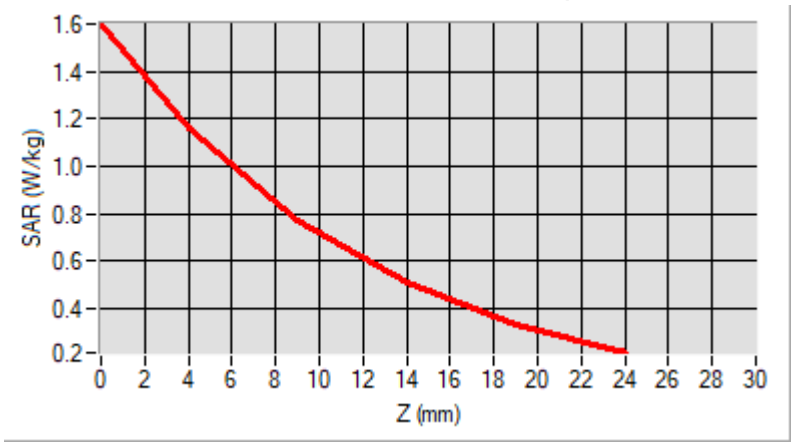
Maximum location: X=-2.00, Y=-9.00 ; SAR Peak: 1.61 W/kg

D. SAR 1g & 10g

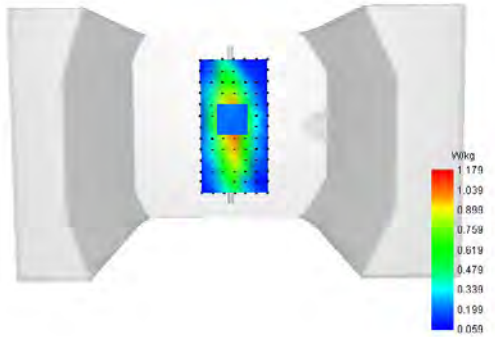
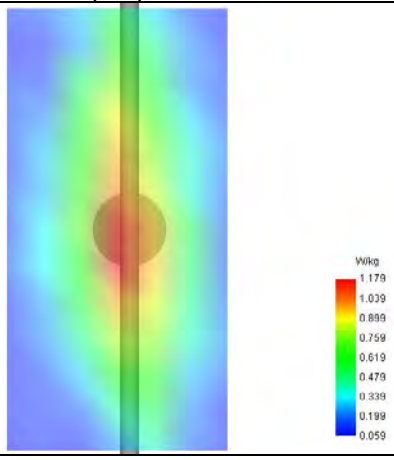
SAR 10g (W/Kg)	1.380
SAR 1g (W/Kg)	2.147
Variation (%)	2.199
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.603	1.163	0.769	0.506	0.333



F. 3D Image

3D screen shot	Hot spot position
	

System check at 835 MHz
Date of measurement: 25/2/2025

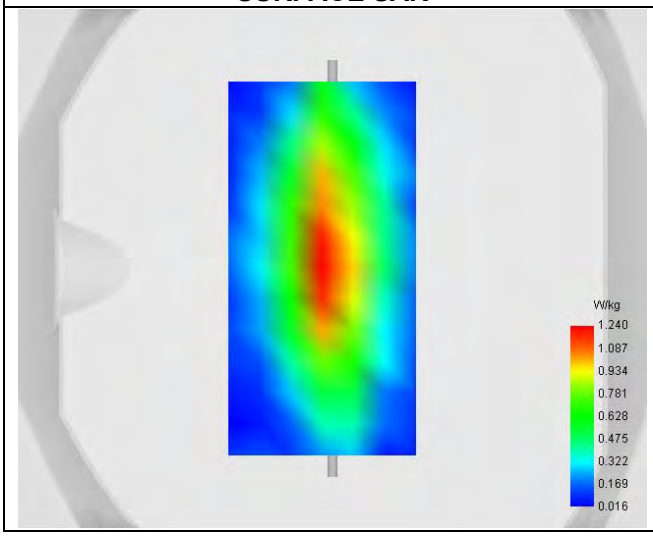
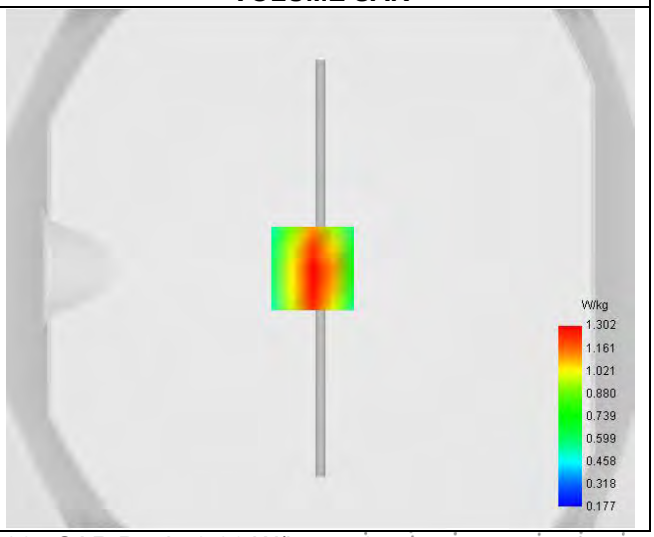
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.80
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW835
Signal	CW

B. Permitivity

Frequency (MHz)	835.000
Relative permitivity (real part)	43.049
Relative permitivity (imaginary part)	20.910
Conductivity (S/m)	0.879

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

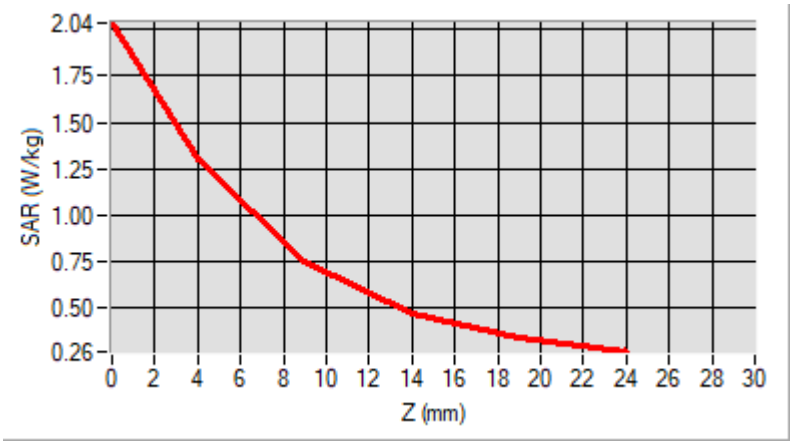
Maximum location: X=-3.00, Y=0.00 ; SAR Peak: 2.06 W/kg

D. SAR 1g & 10g

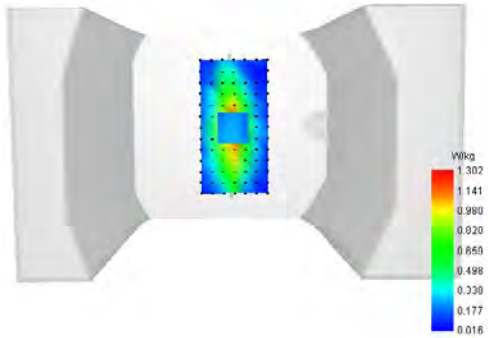
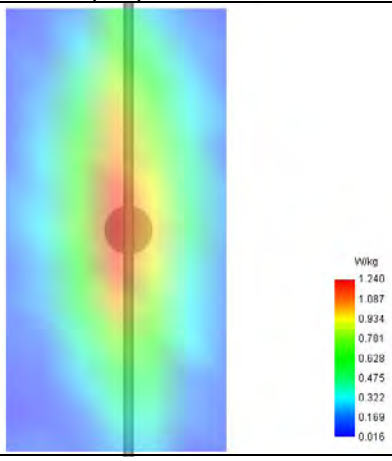
SAR 10g (W/Kg)	1.637
SAR 1g (W/Kg)	2.622
Variation (%)	-0.822
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	2.036	1.302	0.747	0.462	0.331



F. 3D Image

3D screen shot	Hot spot position
	

System check at 1800 MHz
Date of measurement: 5/3/2025

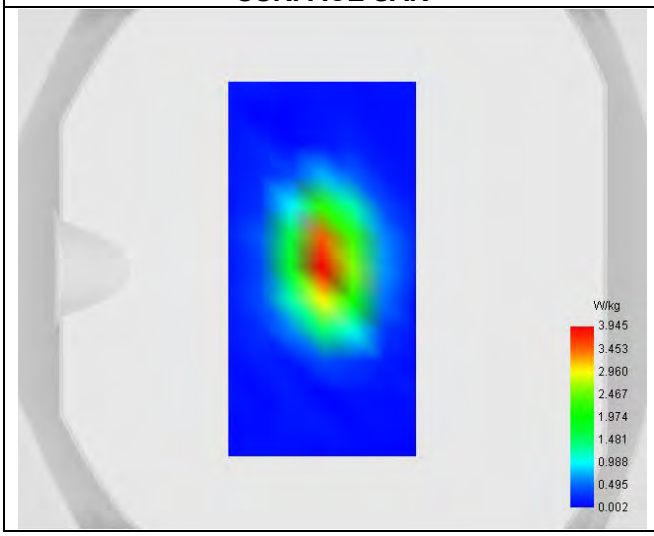
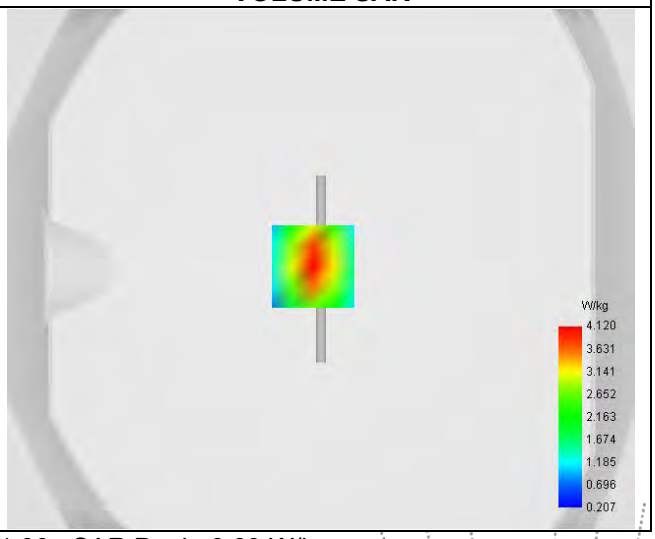
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.01
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW1800
Signal	CW

B. Permitivity

Frequency (MHz)	1800.000
Relative permitivity (real part)	39.808
Relative permitivity (imaginary part)	15.200
Conductivity (S/m)	1.351

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

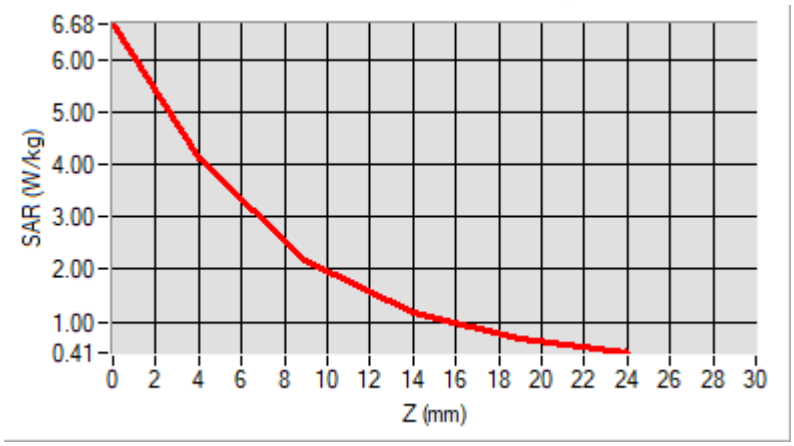
Maximum location: X=-3.00, Y=1.00 ; SAR Peak: 6.69 W/kg

D. SAR 1g & 10g

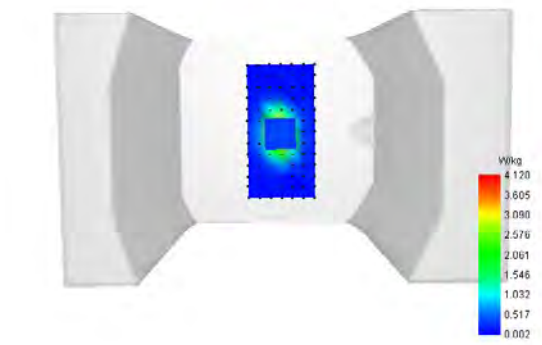
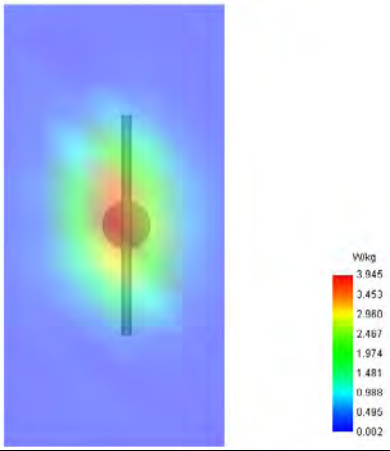
SAR 10g (W/Kg)	5.318
SAR 1g (W/Kg)	10.301
Variation (%)	1.194
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	6.684	4.120	2.184	1.177	0.685



F. 3D Image

3D screen shot	Hot spot position
	

System check at 1900 MHz

Date of measurement: 24/3/2025

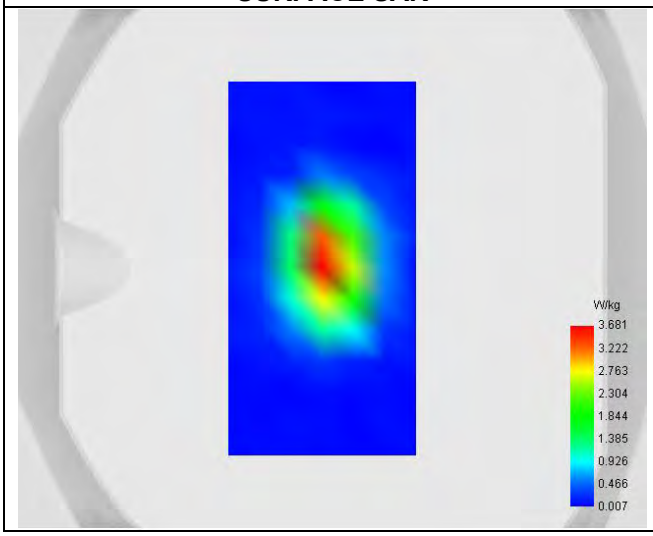
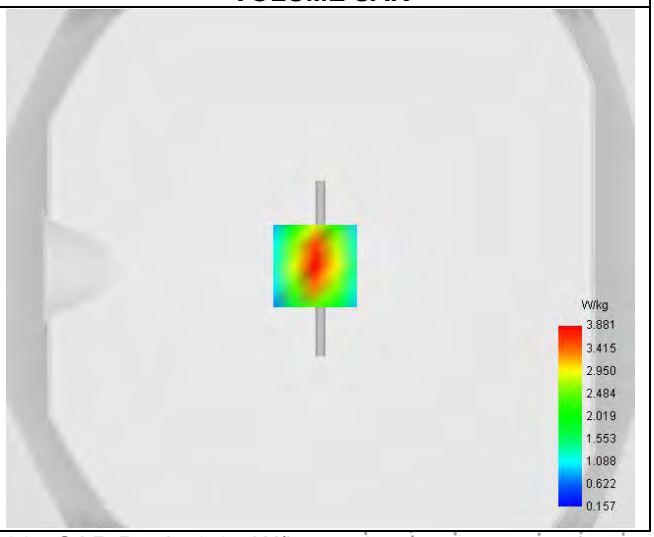
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.11
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW1900
Signal	CW

B. Permitivity

Frequency (MHz)	1900.000
Relative permitivity (real part)	38.492
Relative permitivity (imaginary part)	14.400
Conductivity (S/m)	1.402

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

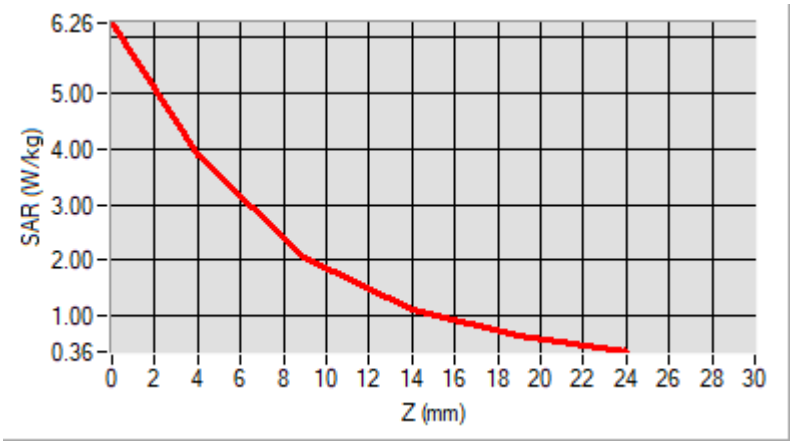
Maximum location: X=-2.00, Y=1.00 ; SAR Peak: 6.27 W/kg

D. SAR 1g & 10g

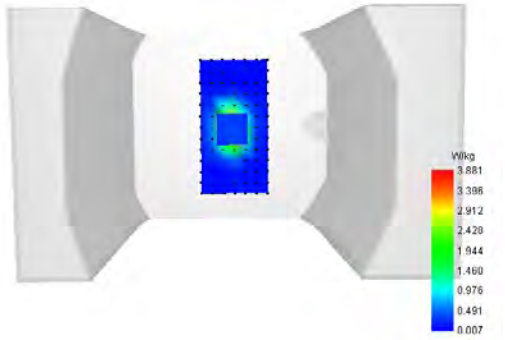
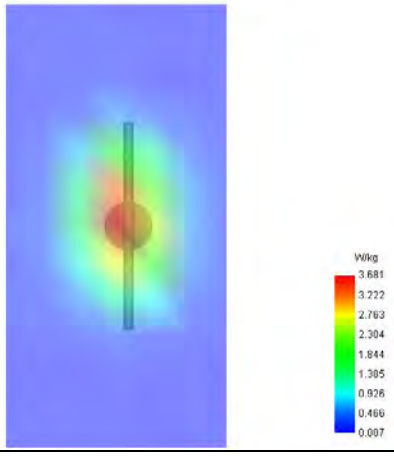
SAR 10g (W/Kg)	5.272
SAR 1g (W/Kg)	10.251
Variation (%)	-0.056
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	6.259	3.881	2.069	1.111	0.634



F. 3D Image

3D screen shot	Hot spot position
	

System check at 2450MHz
Date of measurement: 25/3/2025

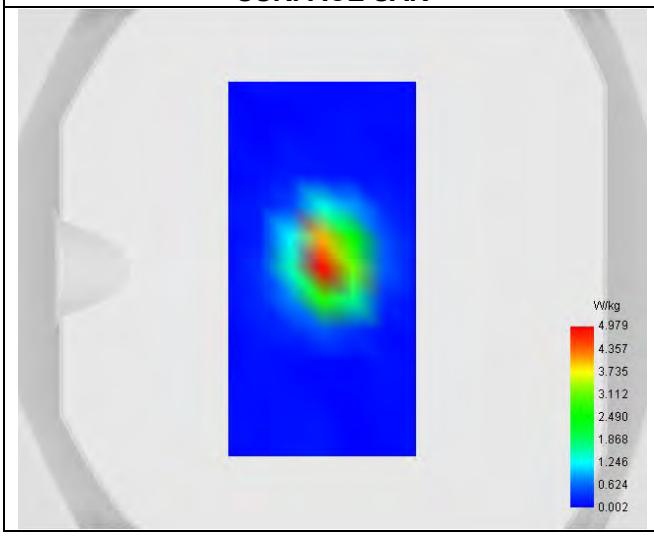
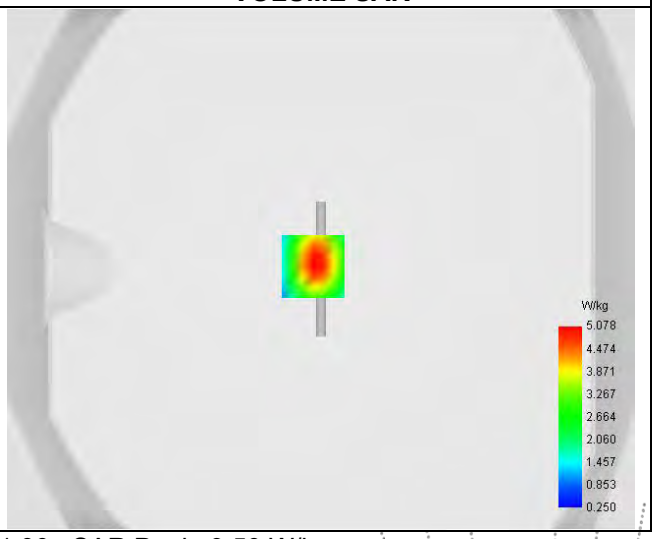
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.32
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x12,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW2450
Signal	CW

B. Permitivity

Frequency (MHz)	2450.000
Relative permitivity (real part)	37.831
Relative permitivity (imaginary part)	14.330
Conductivity (S/m)	1.871

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

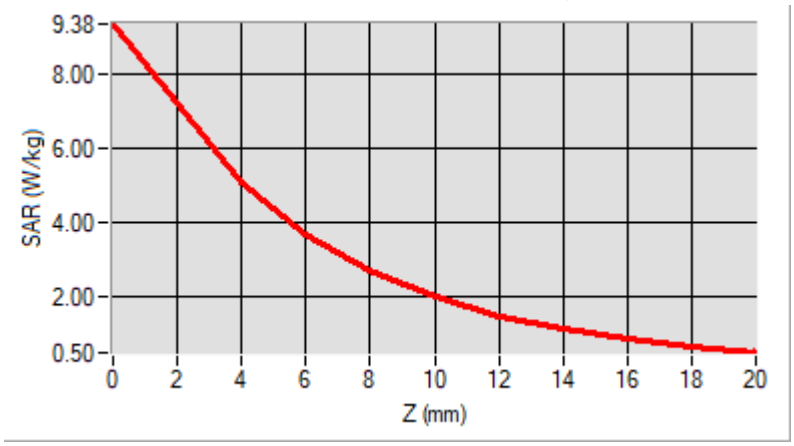
Maximum location: X=-3.00, Y=1.00 ; SAR Peak: 9.50 W/kg

D. SAR 1g & 10g

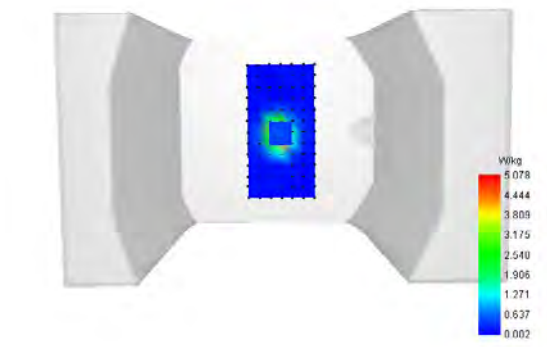
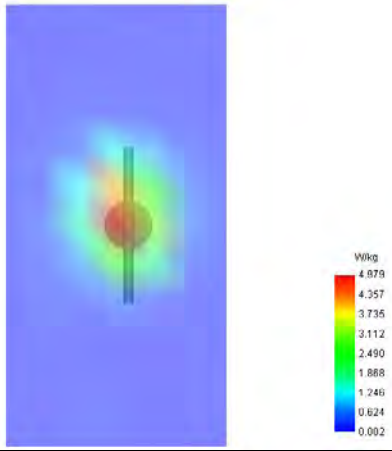
SAR 10g (W/Kg)	6.250
SAR 1g (W/Kg)	13.465
Variation (%)	1.512
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00
SAR (W/Kg)	9.380	5.078	3.712	2.709	2.001	1.499	1.138	0.871	0.667



F. 3D Image

3D screen shot	Hot spot position
	

System check at 2600MHz

Date of measurement: 18/2/2025

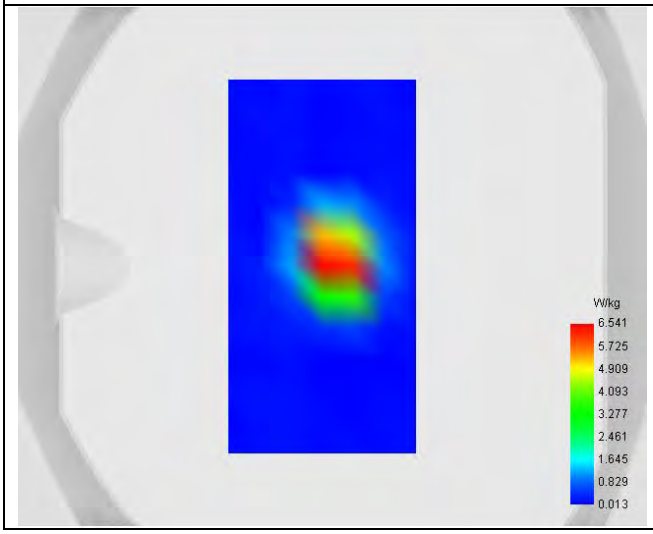
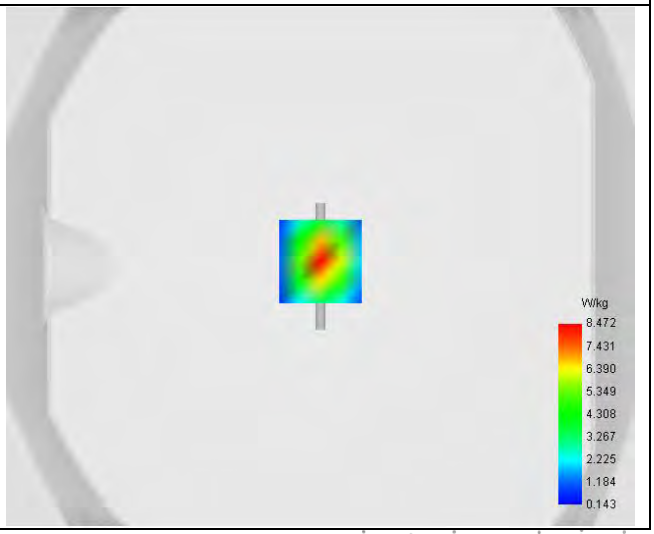
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.19
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW2600
Signal	CW

B. Permitivity

Frequency (MHz)	2600.000
Relative permitivity (real part)	38.235
Relative permitivity (imaginary part)	14.889
Conductivity (S/m)	1.971

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

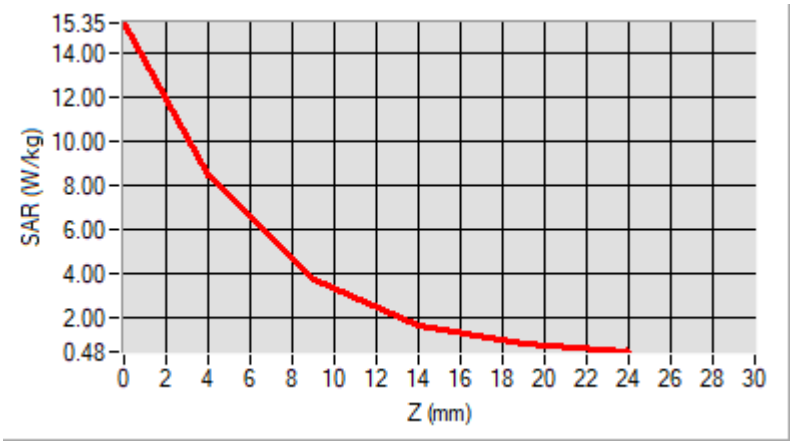
Maximum location: X=0.00, Y=2.00 ; SAR Peak: 15.35 W/kg

D. SAR 1g & 10g

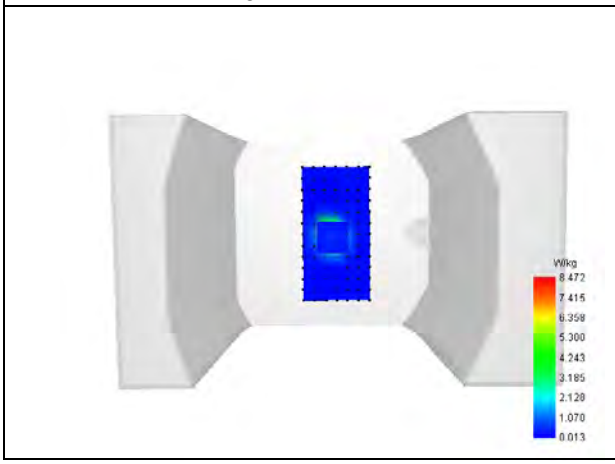
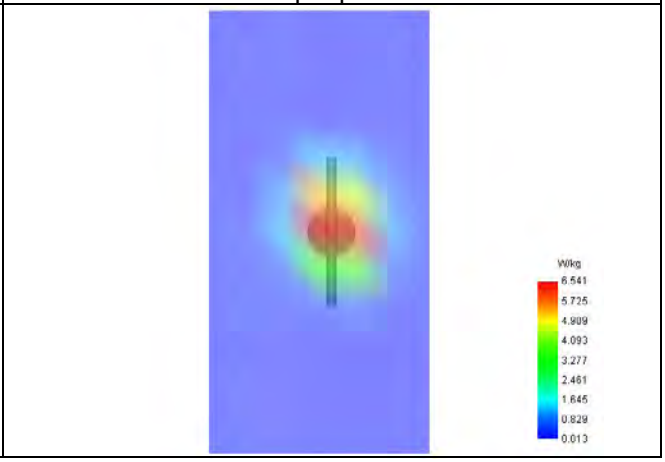
SAR 10g (W/Kg)	6.187
SAR 1g (W/Kg)	14.821
Variation (%)	-0.762
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	15.347	8.472	3.768	1.677	0.856



F. 3D Image

3D screen shot	Hot spot position
	

System check at 5200 MHz

Date of measurement: 25/3/2025

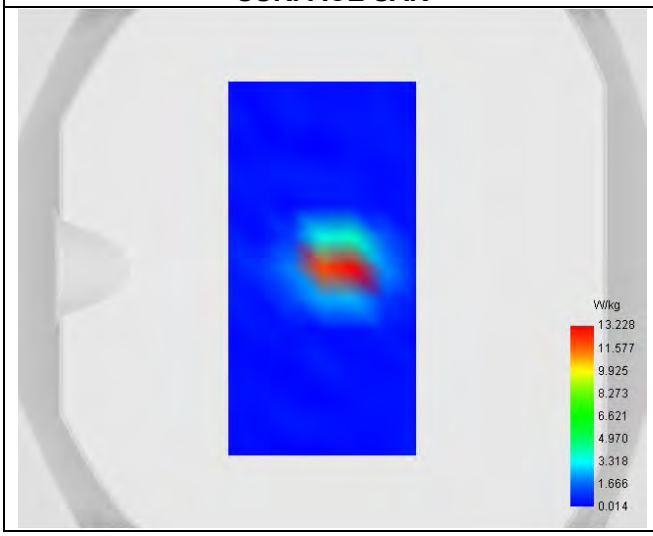
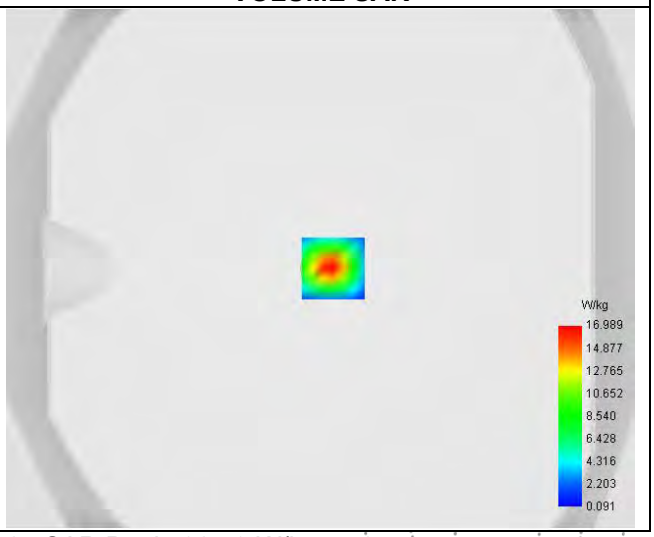
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.97
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2mm
Phantom	Validation plane
Device Position	Dipole
Band	CW5200
Signal	CW

B. Permitivity

Frequency (MHz)	5200.000
Relative permitivity (real part)	36.592
Relative permitivity (imaginary part)	18.140
Conductivity (S/m)	4.476

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

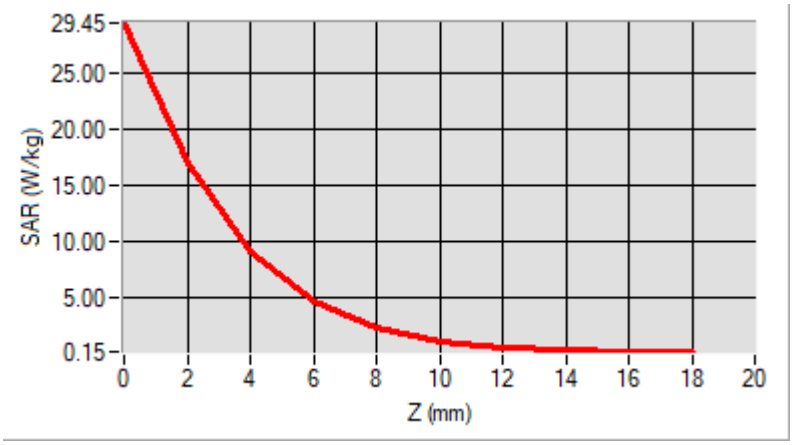
Maximum location: X=5.00, Y=0.00 ; SAR Peak: 30.79 W/kg

D. SAR 1g & 10g

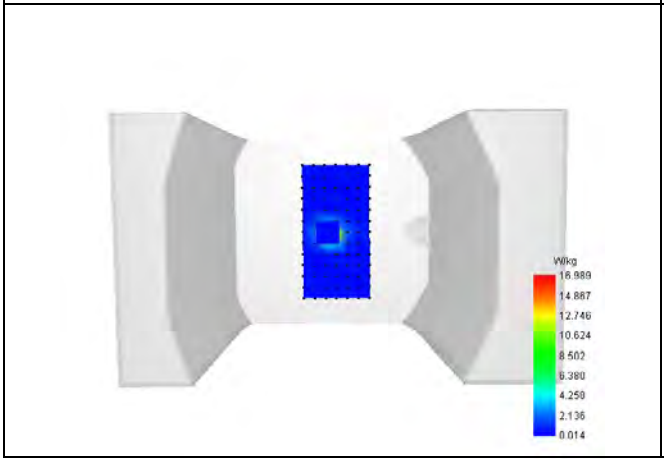
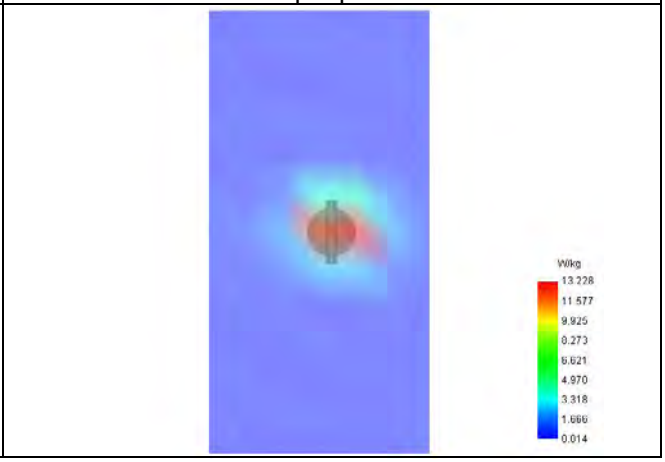
SAR 10g (W/Kg)	5.381
SAR 1g (W/Kg)	19.808
Variation (%)	-1.087
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00
SAR (W/Kg)	29.452	16.989	9.130	4.585	2.232	1.083	0.552	0.315	0.209



F. 3D Image

3D screen shot	Hot spot position
	

System check at 5800 MHz

Date of measurement: 25/3/2025

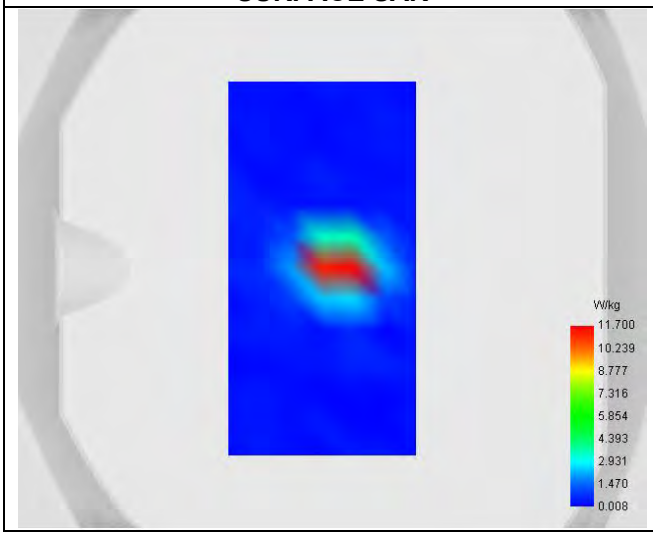
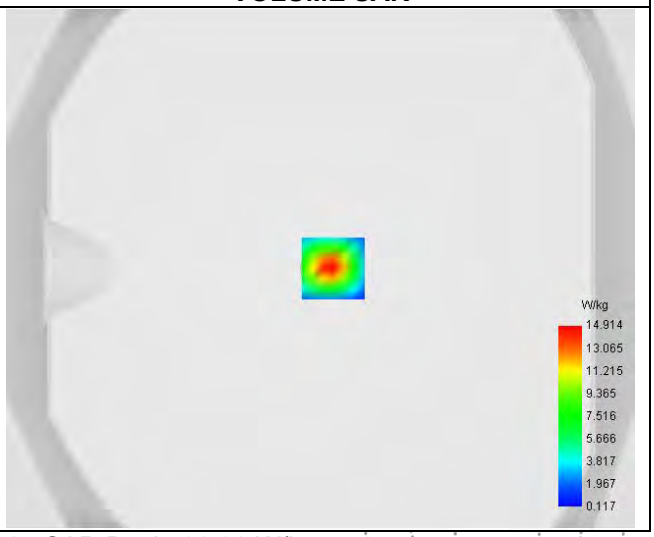
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.05
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2mm
Phantom	Validation plane
Device Position	Dipole
Band	CW5800
Signal	CW

B. Permitivity

Frequency (MHz)	5800.000
Relative permitivity (real part)	34.857
Relative permitivity (imaginary part)	18.620
Conductivity (S/m)	5.416

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

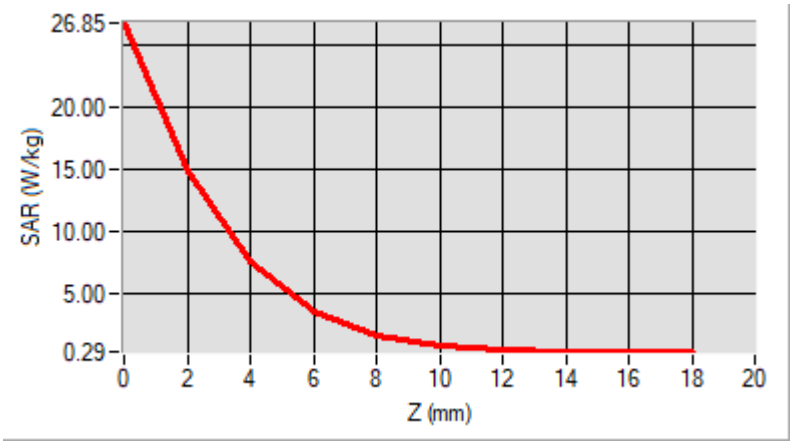
Maximum location: X=5.00, Y=0.00 ; SAR Peak: 28.22 W/kg

D. SAR 1g & 10g

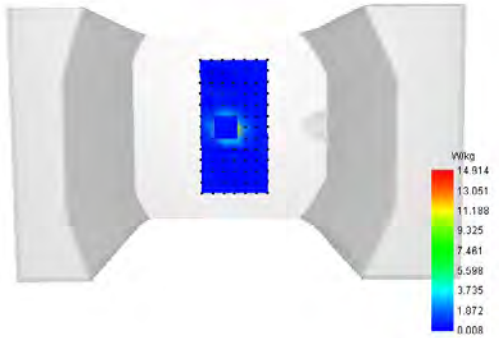
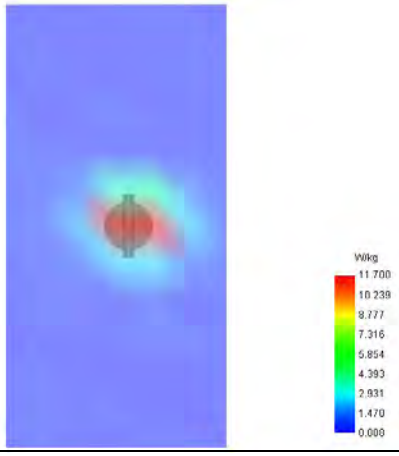
SAR 10g (W/Kg)	5.471
SAR 1g (W/Kg)	18.345
Variation (%)	0.680
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00
SAR (W/Kg)	26.852	14.914	7.581	3.559	1.627	0.770	0.423	0.303	0.288



F. 3D Image

3D screen shot	Hot spot position
	

15.2 SAR Test Graph Results

Plot 1
Date of measurement: 25/3/2025

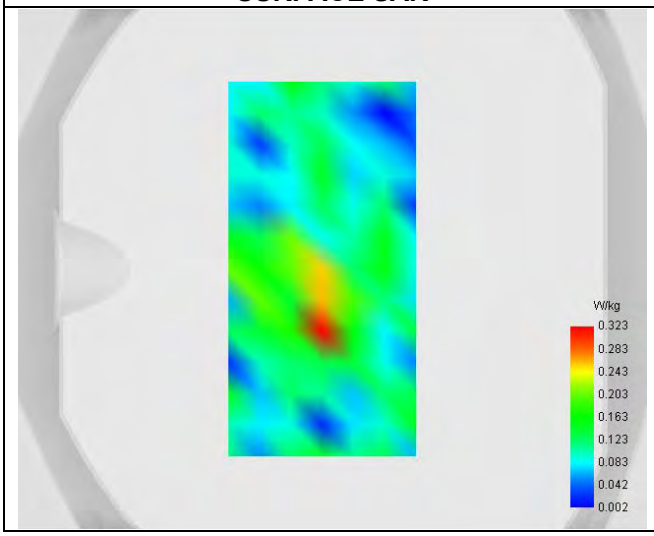
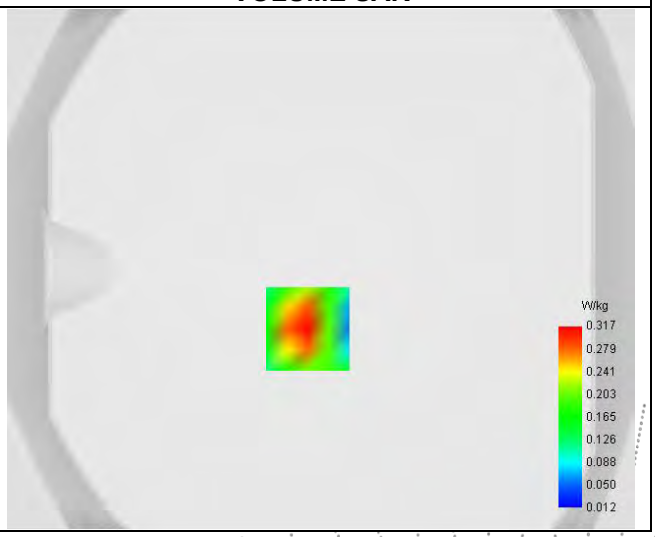
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.11
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	ISM
Signal	IEEE 802.11 b

B. Permitivity

Frequency (MHz)	2462.000
Relative permitivity (real part)	37.831
Relative permitivity (imaginary part)	13.207
Conductivity (S/m)	1.871

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

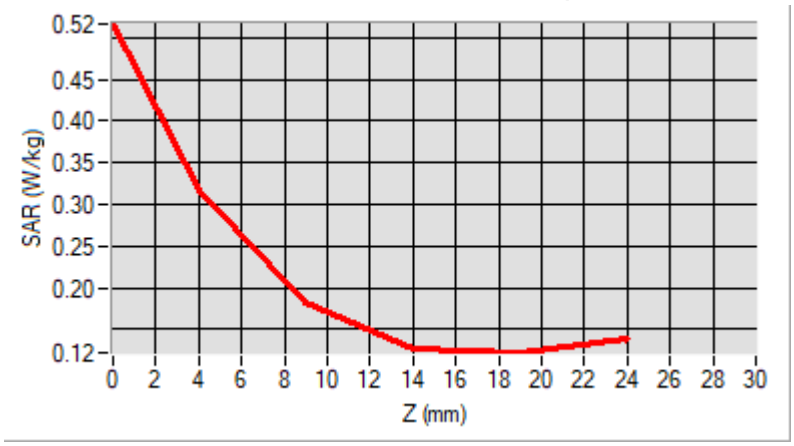
Maximum location: X=-5.00, Y=-23.00 ; SAR Peak: 0.54 W/kg

D. SAR 1g & 10g

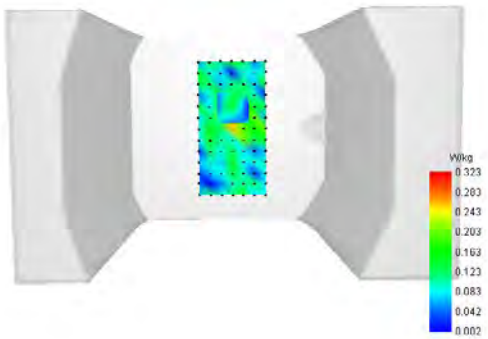
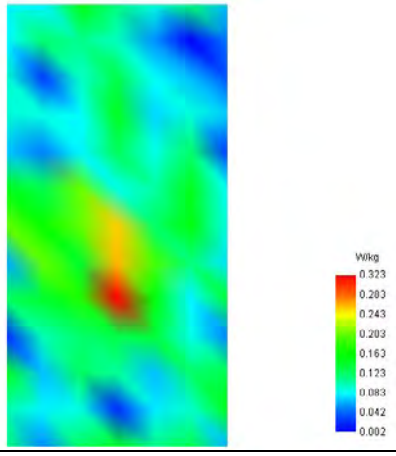
SAR 10g (W/Kg)	0.176
SAR 1g (W/Kg)	0.311
Variation (%)	3.730
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.517	0.317	0.181	0.128	0.122



F. 3D Image

3D screen shot	Hot spot position
	

Plot 2
Date of measurement: 25/3/2025

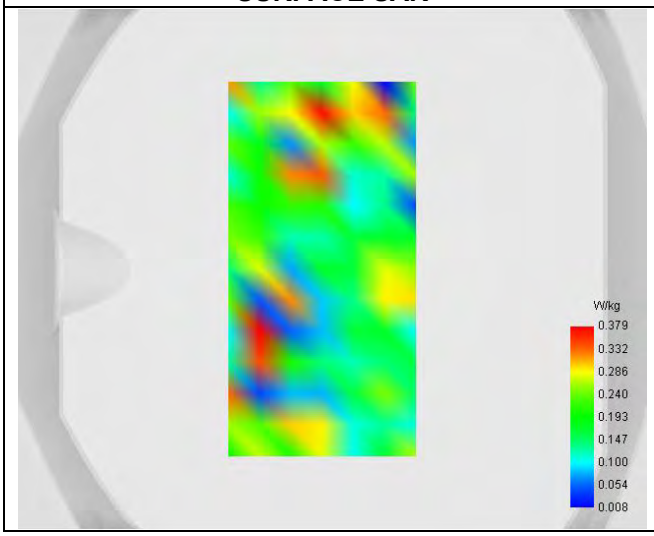
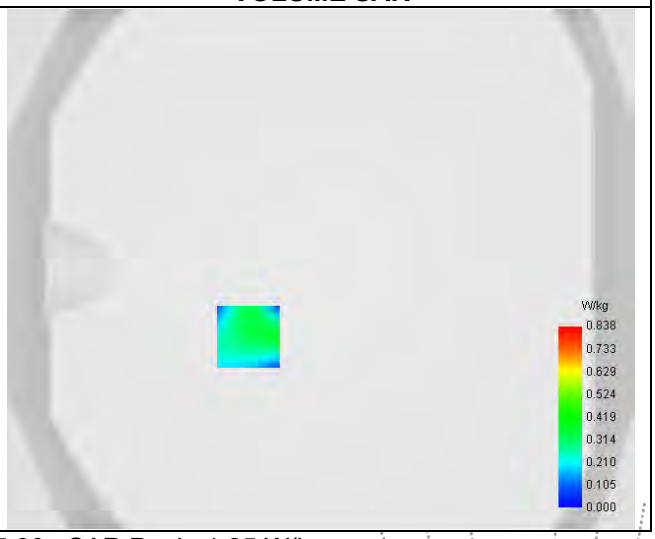
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.18
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm
Phantom	Validation plane
Device Position	Body
Band	5200
Signal	--

B. Permitivity

Frequency (MHz)	5180.000
Relative permitivity (real part)	36.592
Relative permitivity (imaginary part)	16.130
Conductivity (S/m)	4.476

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

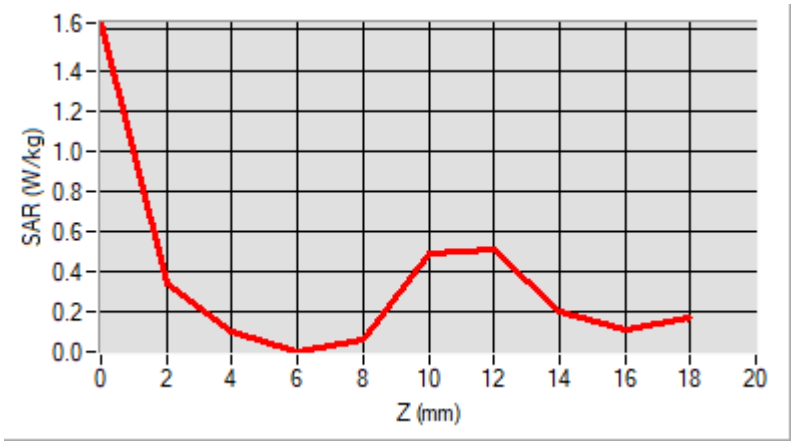
Maximum location: X=7.00, Y=5.00 ; SAR Peak: 1.25 W/kg

D. SAR 1g & 10g

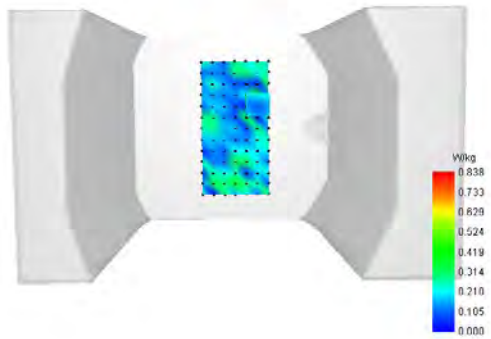
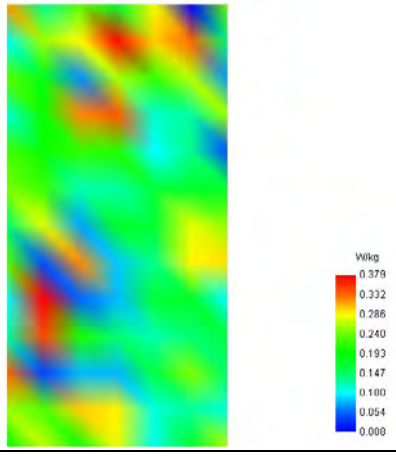
SAR 10g (W/Kg)	0.133
SAR 1g (W/Kg)	0.288
Variation (%)	-2.580
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00
SAR (W/Kg)	1.635	0.341	0.097	0.000	0.062	0.488	0.507	0.198	0.113



F. 3D Image

3D screen shot	Hot spot position
	

Plot 3
Date of measurement: 25/3/2025

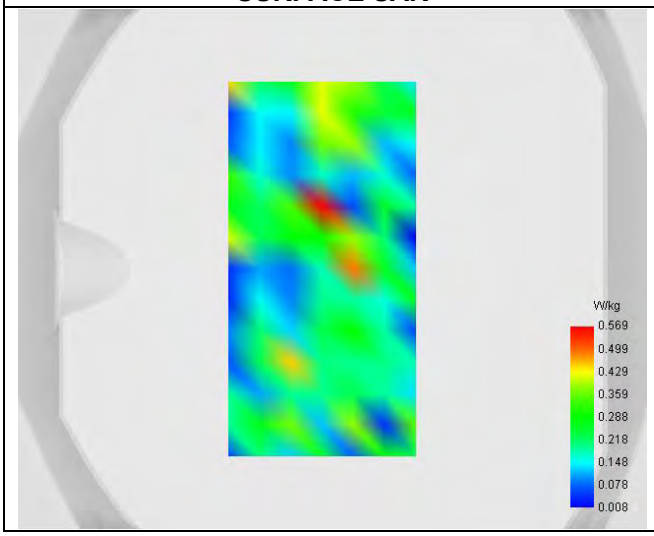
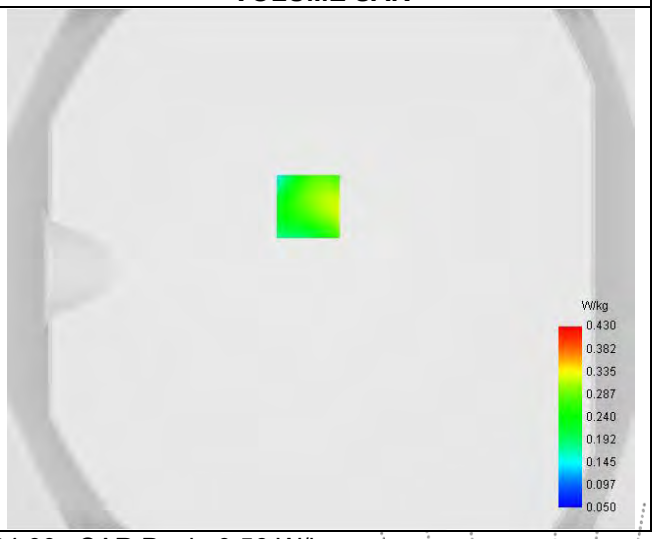
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.15
Area Scan	surf_sam_plan.txt
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm
Phantom	Validation plane
Device Position	Body
Band	5800
Signal	--

B. Permitivity

Frequency (MHz)	5745.000
Relative permitivity (real part)	34.857
Relative permitivity (imaginary part)	16.355
Conductivity (S/m)	5.416

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

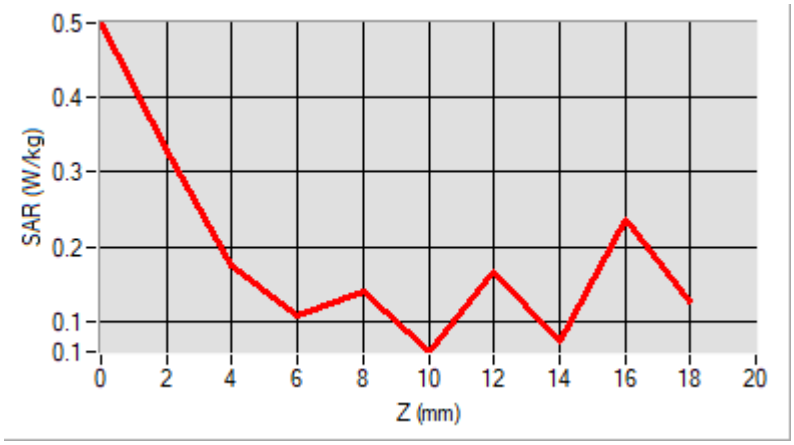
Maximum location: X=-5.00, Y=24.00 ; SAR Peak: 0.56 W/kg

D. SAR 1g & 10g

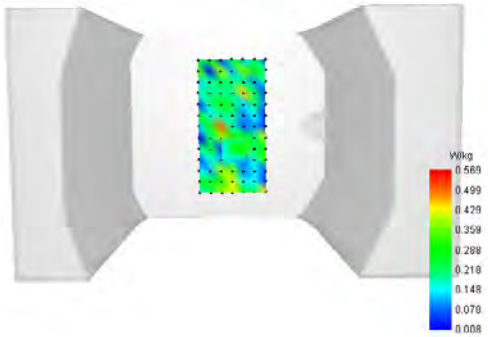
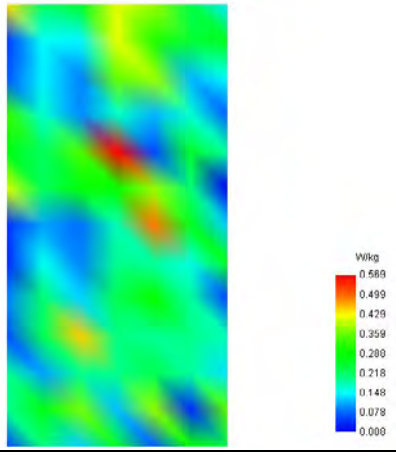
SAR 10g (W/Kg)	0.157
SAR 1g (W/Kg)	0.293
Variation (%)	3.100
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00
SAR (W/Kg)	0.500	0.327	0.176	0.108	0.141	0.060	0.167	0.075	0.238



F. 3D Image

3D screen shot	Hot spot position
	

Plot 4
Date of measurement: 25/2/2025

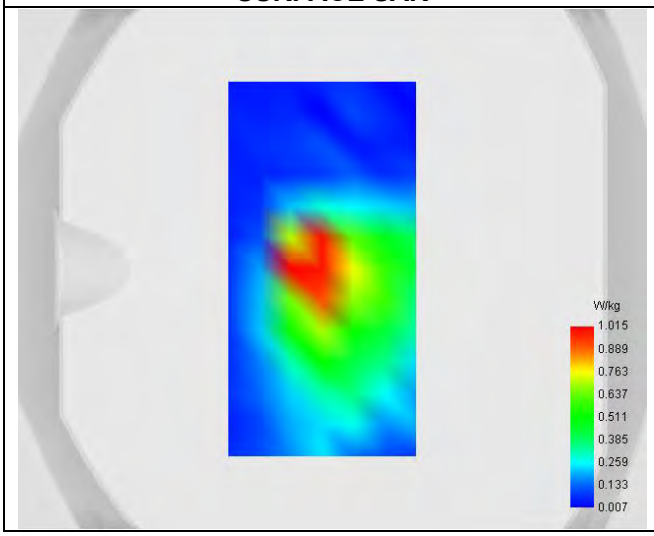
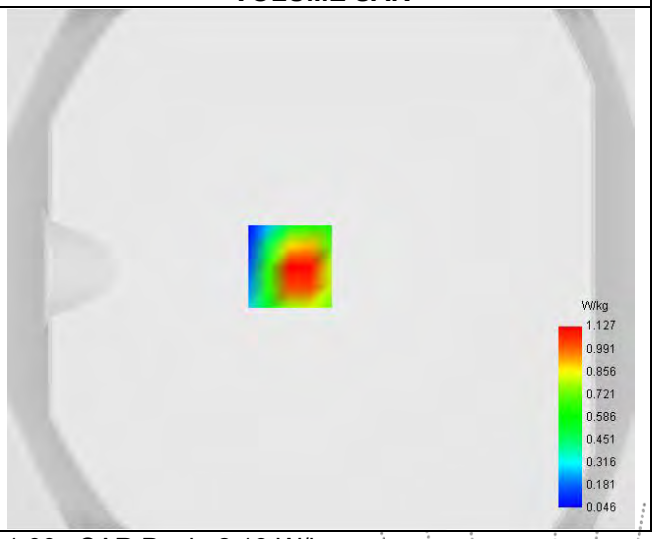
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.81
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	GPRS850
Signal	TDMA (GPRS)

B. Permitivity

Frequency (MHz)	836.600
Relative permitivity (real part)	43.049
Relative permitivity (imaginary part)	19.400
Conductivity (S/m)	0.879

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

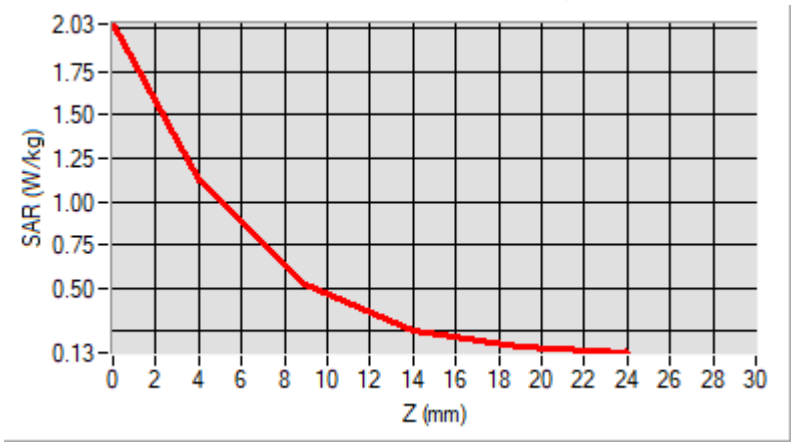
Maximum location: X=-12.00, Y=1.00 ; SAR Peak: 2.13 W/kg

D. SAR 1g & 10g

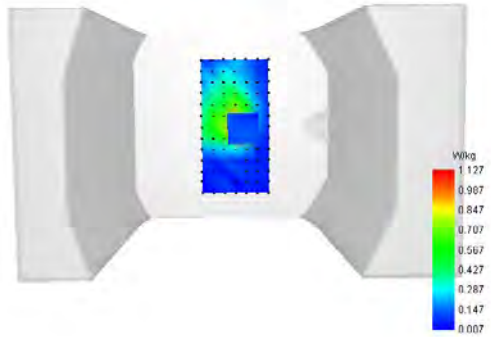
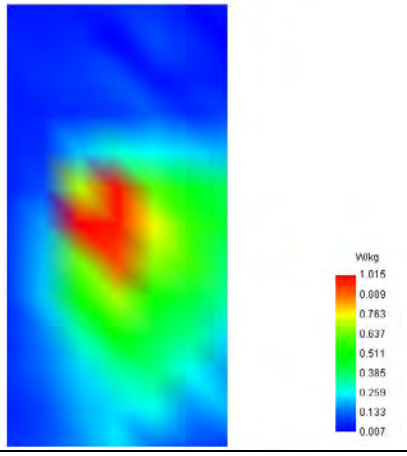
SAR 10g (W/Kg)	0.527
SAR 1g (W/Kg)	1.120
Variation (%)	-0.430
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	2.026	1.127	0.519	0.258	0.164



F. 3D Image

3D screen shot	Hot spot position
	

Plot 5
Date of measurement: 24/3/2025

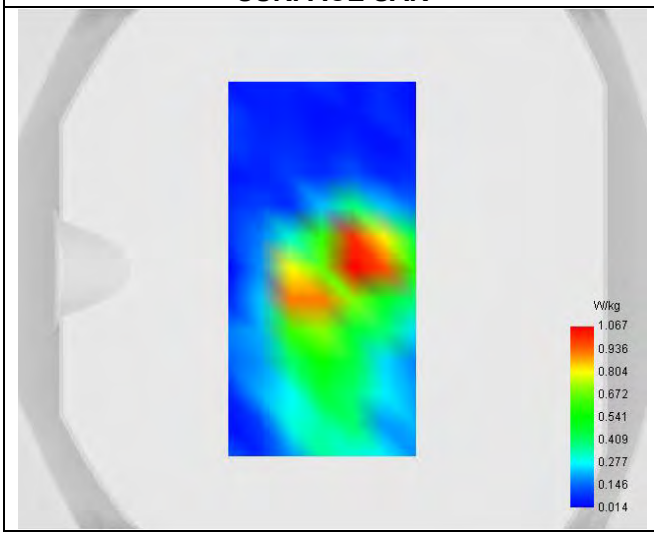
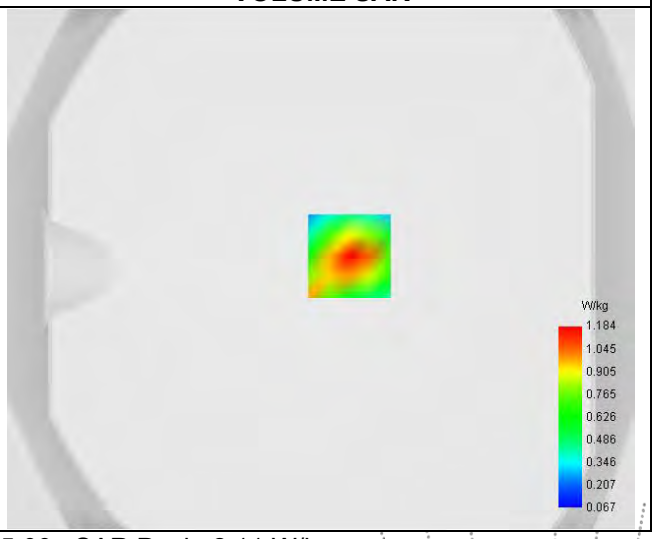
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.04
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	GPRS1900
Signal	TDMA (GPRS)

B. Permitivity

Frequency (MHz)	1850.200
Relative permitivity (real part)	38.492
Relative permitivity (imaginary part)	13.629
Conductivity (S/m)	1.402

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

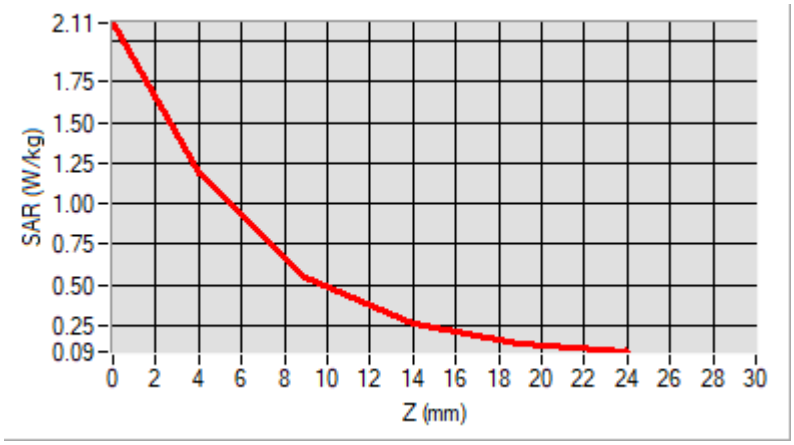
Maximum location: X=11.00, Y=5.00 ; SAR Peak: 2.11 W/kg

D. SAR 1g & 10g

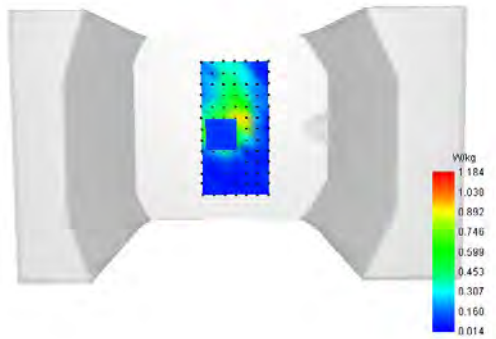
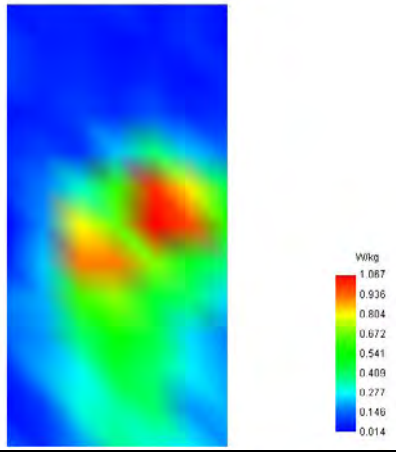
SAR 10g (W/Kg)	0.487
SAR 1g (W/Kg)	1.099
Variation (%)	-1.670
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	2.115	1.185	0.543	0.254	0.140



F. 3D Image

3D screen shot	Hot spot position
	

Plot 6
Date of measurement: 24/3/2025

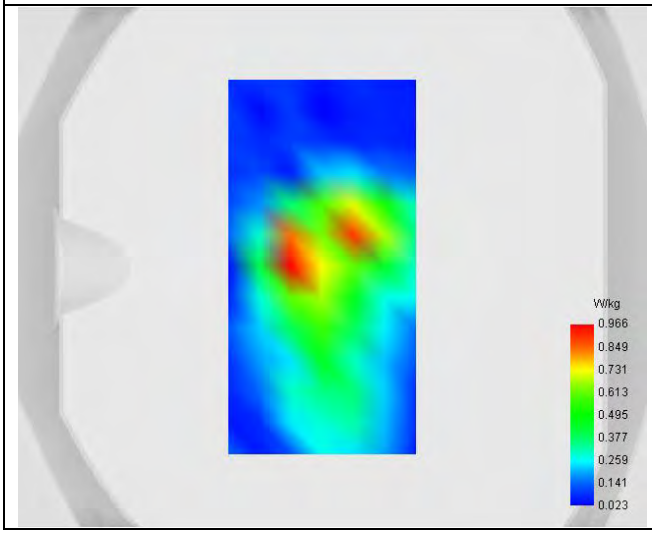
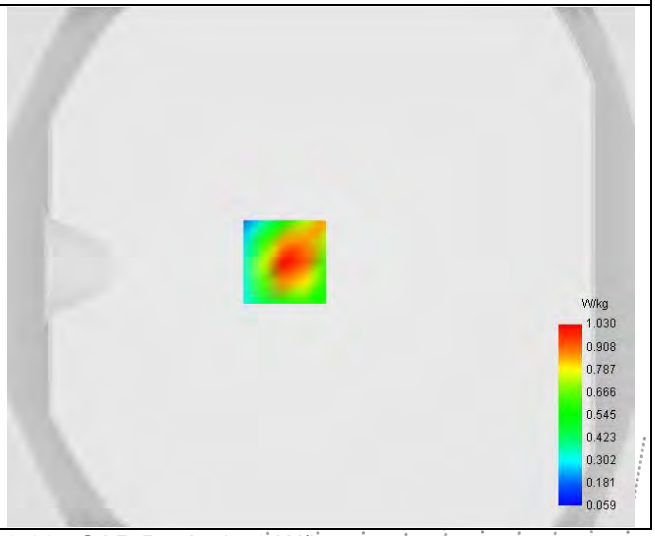
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.04
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	Band 2 (1900)
Signal	WCDMA
Mode	Release 99
Connection Type	RMC, 12.2 kbps

B. Permitivity

Frequency (MHz)	1880.000
Relative permitivity (real part)	38.492
Relative permitivity (imaginary part)	13.408
Conductivity (S/m)	1.402

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

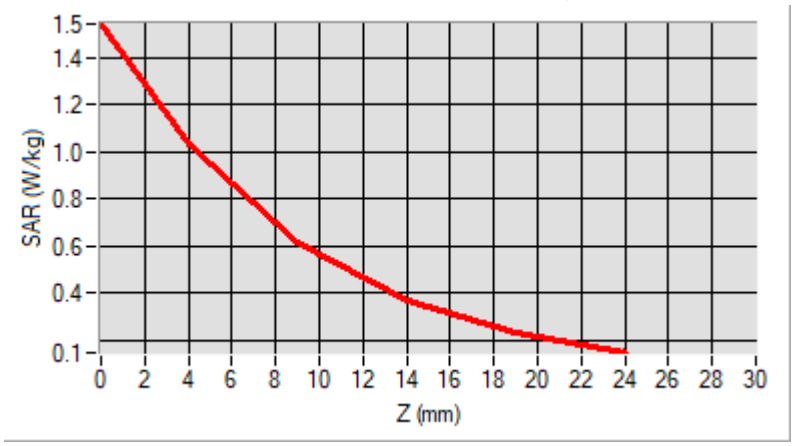
Maximum location: X=-14.00, Y=2.00 ; SAR Peak: 1.59 W/kg

D. SAR 1g & 10g

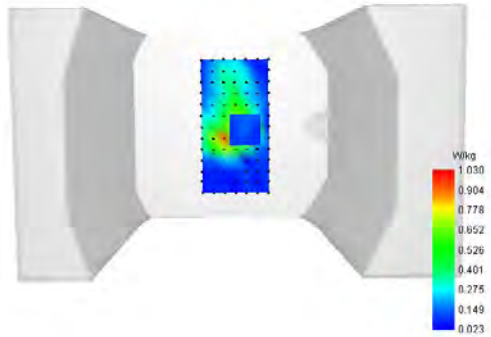
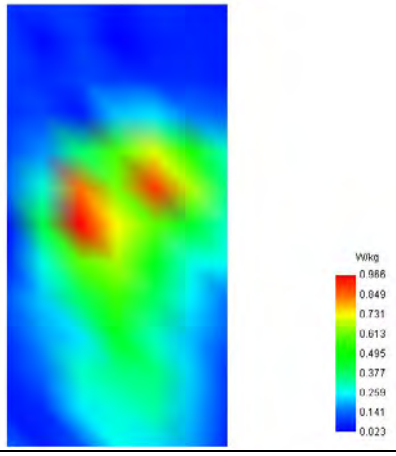
SAR 10g (W/Kg)	0.525
SAR 1g (W/Kg)	0.959
Variation (%)	-3.610
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.544	1.030	0.612	0.369	0.233



F. 3D Image

3D screen shot	Hot spot position
	

Plot 7
Date of measurement: 5/3/2025

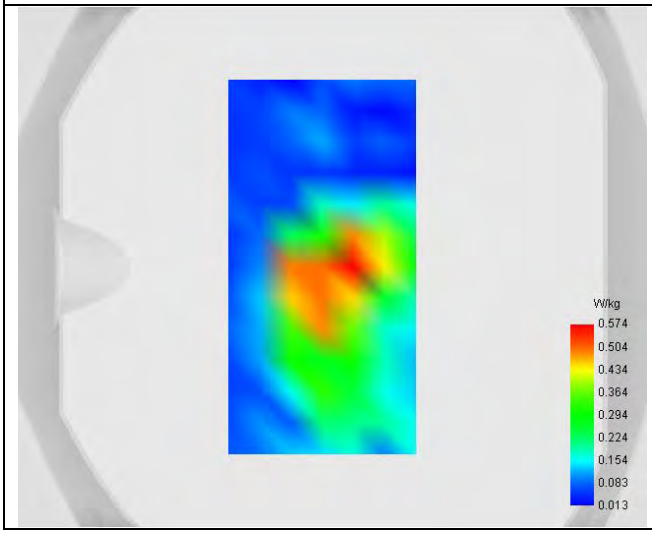
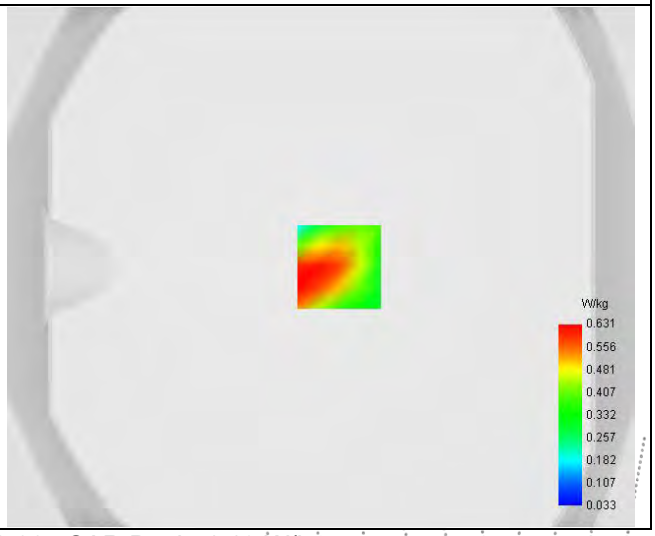
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.96
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	Band 4 (1700)
Signal	WCDMA
Mode	Release 99
Connection Type	RMC, 12.2 kbps

B. Permitivity

Frequency (MHz)	1712.400
Relative permitivity (real part)	39.808
Relative permitivity (imaginary part)	14.136
Conductivity (S/m)	1.351

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

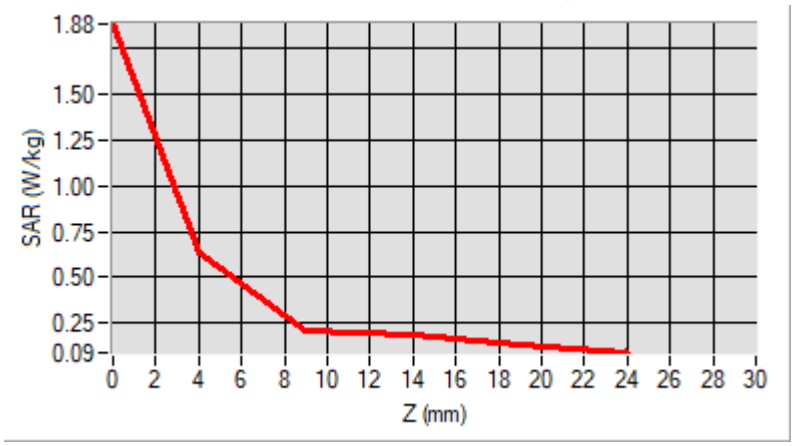
Maximum location: X=7.00, Y=0.00 ; SAR Peak: 1.13 W/kg

D. SAR 1g & 10g

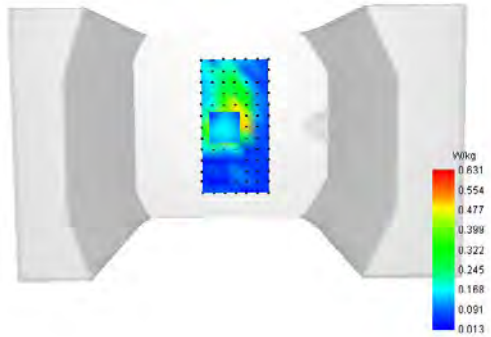
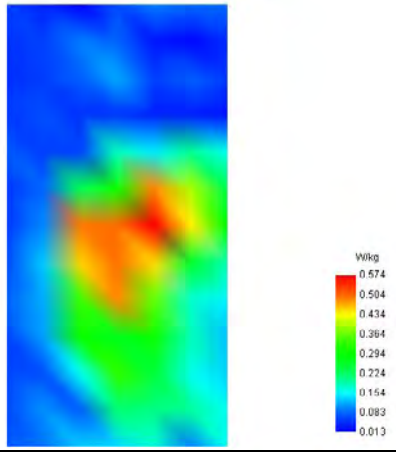
SAR 10g (W/Kg)	0.297
SAR 1g (W/Kg)	0.611
Variation (%)	1.080
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.882	0.631	0.210	0.193	0.135



F. 3D Image

3D screen shot	Hot spot position
	

Plot 8
Date of measurement: 18/2/2025

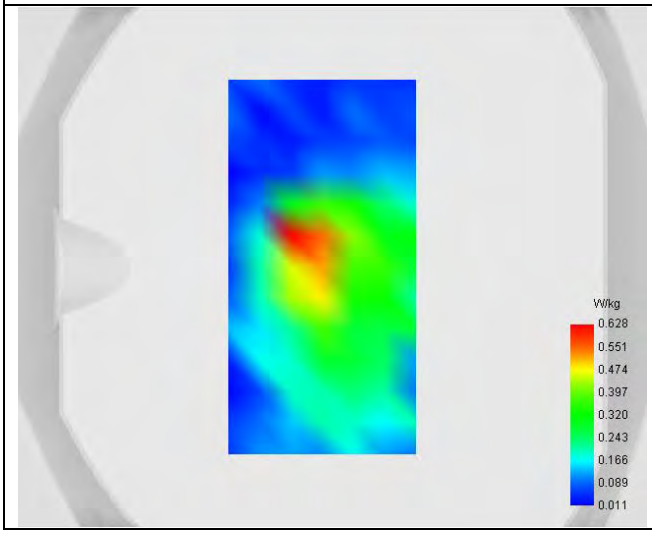
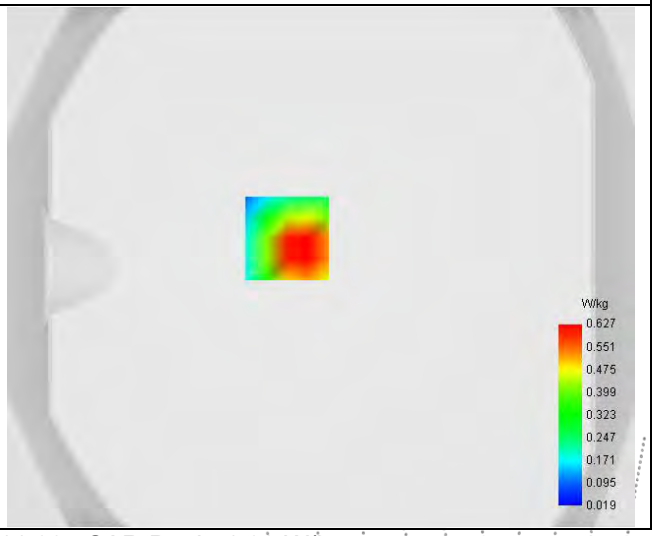
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.81
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	Band 5 (850)
Signal	WCDMA
Mode	Release 99
Connection Type	RMC, 12.2 kbps

B. Permitivity

Frequency (MHz)	846.600
Relative permitivity (real part)	40.472
Relative permitivity (imaginary part)	19.400
Conductivity (S/m)	0.900

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

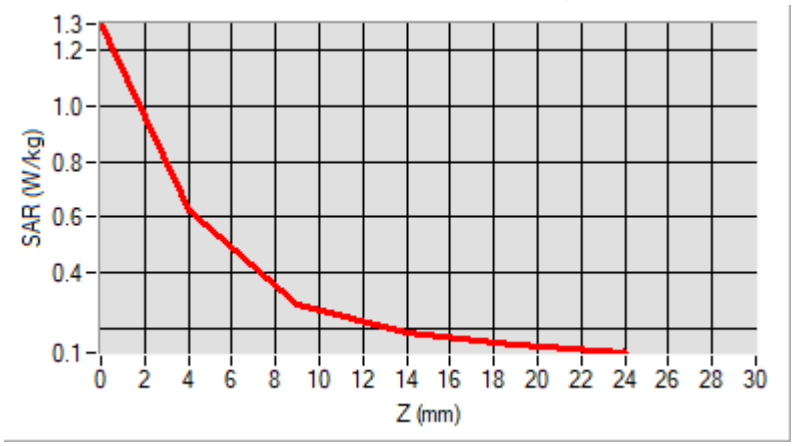
Maximum location: X=-13.00, Y=11.00 ; SAR Peak: 1.08 W/kg

D. SAR 1g & 10g

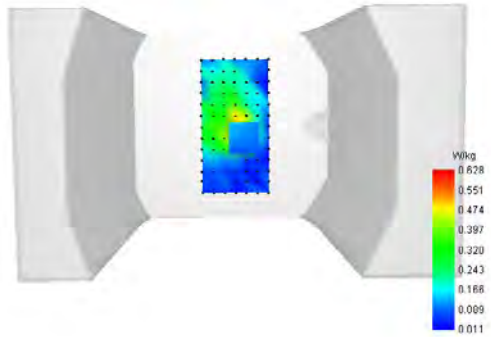
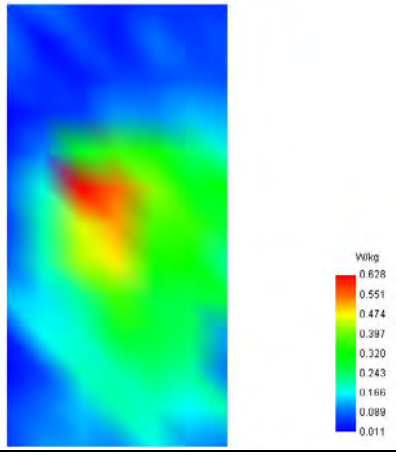
SAR 10g (W/Kg)	0.331
SAR 1g (W/Kg)	0.629
Variation (%)	1.960
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.294	0.627	0.284	0.185	0.144



F. 3D Image

3D screen shot	Hot spot position
	

Plot 9
Date of measurement: 24/3/2025

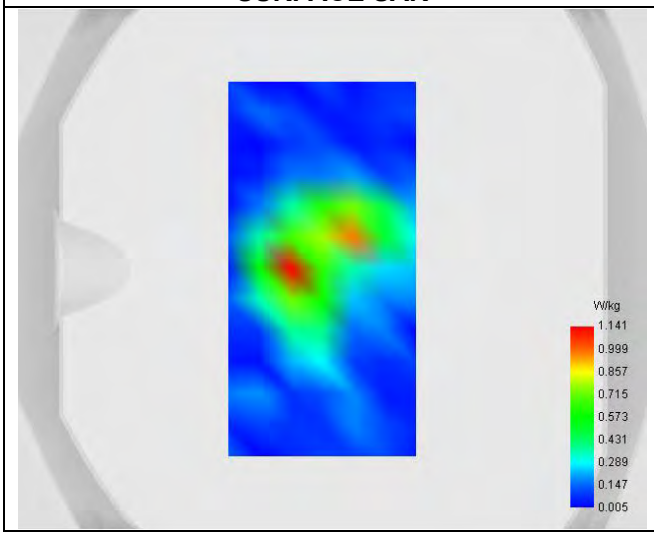
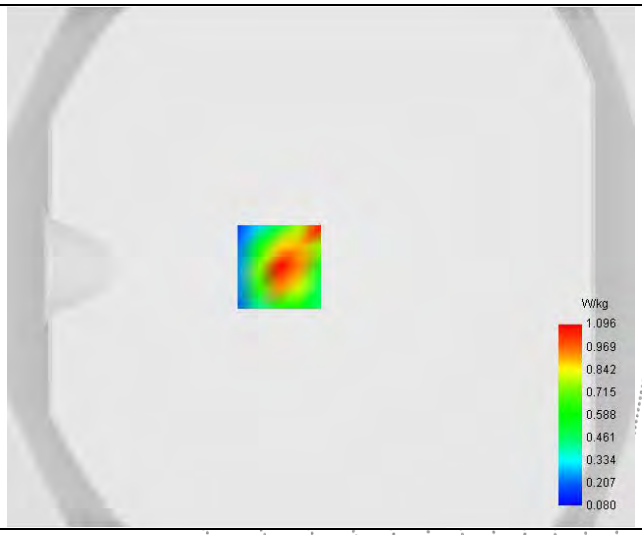
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.04
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 2
Signal	LTE FDD
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permitivity

Frequency (MHz)	1900.000
Relative permitivity (real part)	38.492
Relative permitivity (imaginary part)	13.307
Conductivity (S/m)	1.402

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

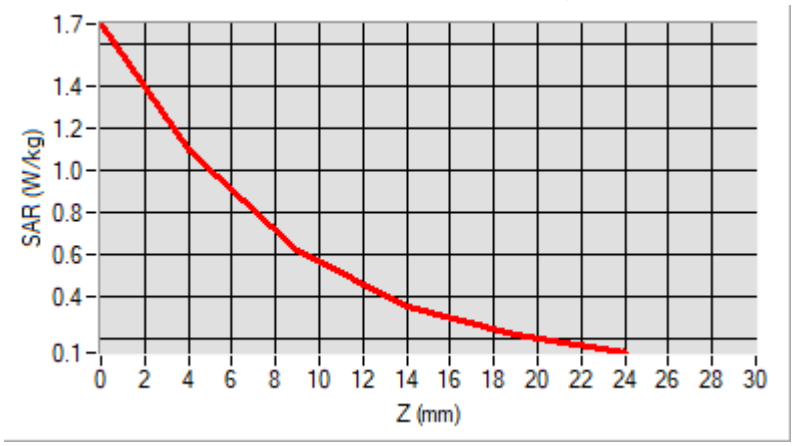
Maximum location: X=-16.00, Y=0.00 ; SAR Peak: 1.99 W/kg

D. SAR 1g & 10g

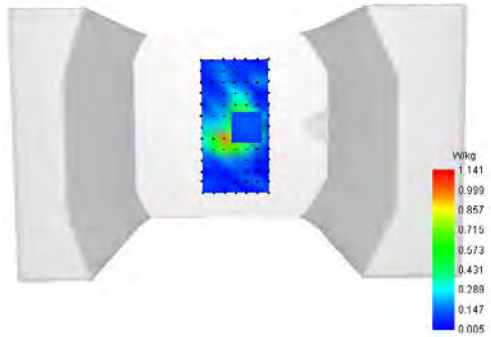
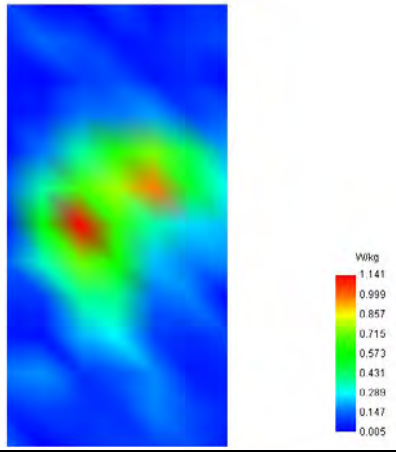
SAR 10g (W/Kg)	0.449
SAR 1g (W/Kg)	0.960
Variation (%)	-2.650
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.700	1.096	0.622	0.359	0.221



F. 3D Image

3D screen shot	Hot spot position
	

Plot 10

Date of measurement: 5/3/2025

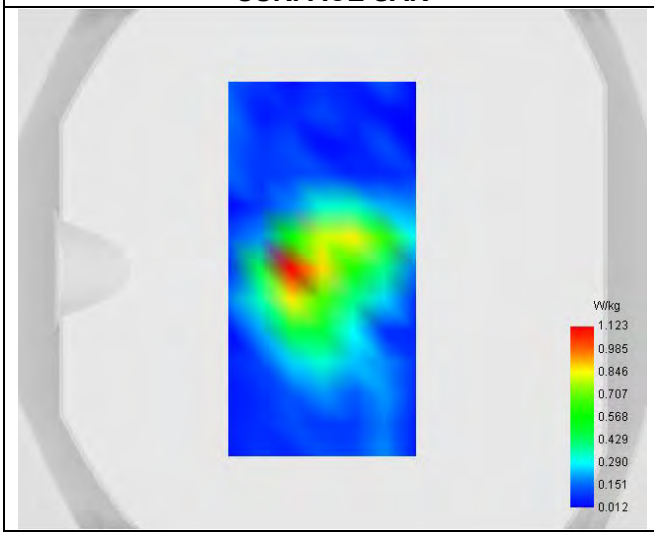
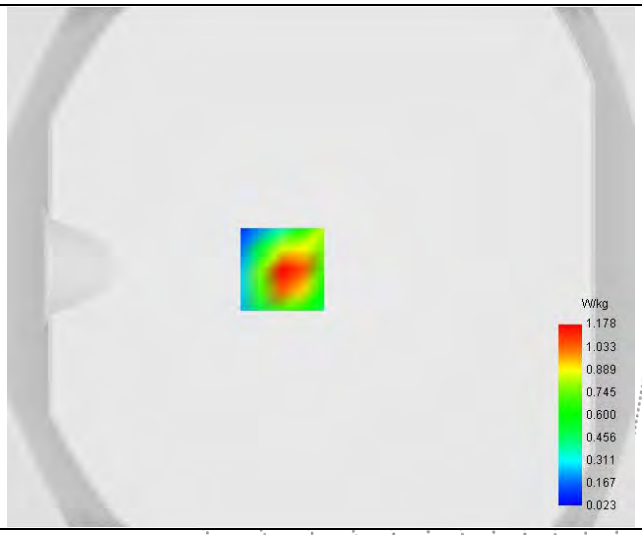
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.96
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 4
Signal	LTE FDD
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permitivity

Frequency (MHz)	1720.000
Relative permitivity (real part)	39.808
Relative permitivity (imaginary part)	14.186
Conductivity (S/m)	1.351

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

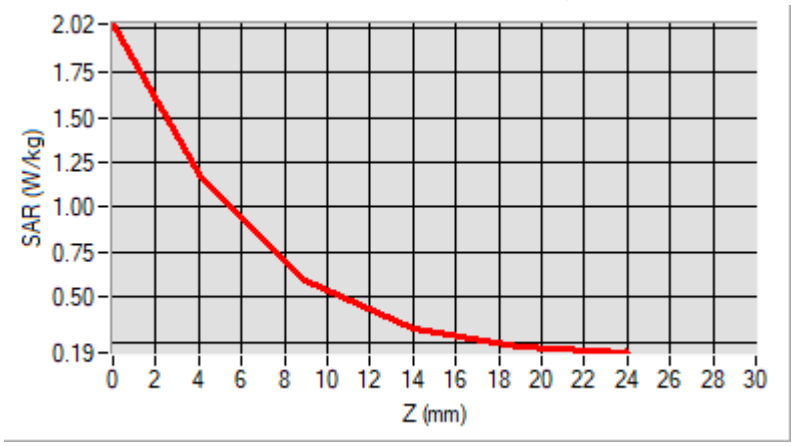
Maximum location: X=-15.00, Y=-1.00 ; SAR Peak: 2.07 W/kg

D. SAR 1g & 10g

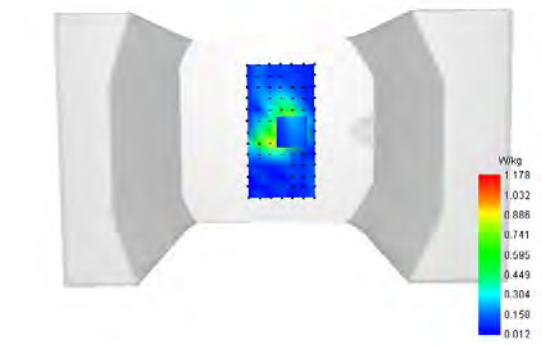
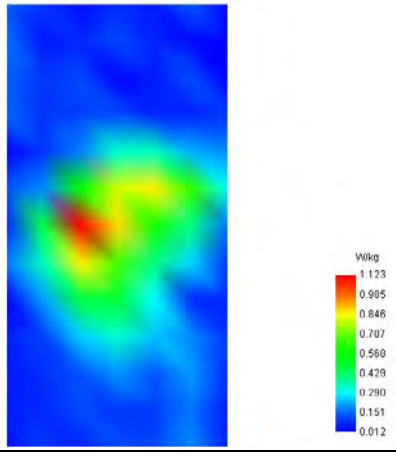
SAR 10g (W/Kg)	0.561
SAR 1g (W/Kg)	1.121
Variation (%)	-2.880
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	2.017	1.178	0.592	0.329	0.231



F. 3D Image

3D screen shot	Hot spot position
	

Plot 11

Date of measurement: 25/2/2025

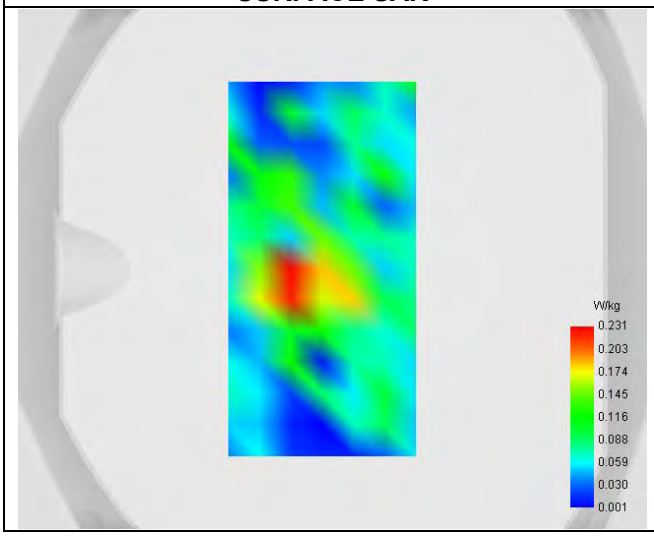
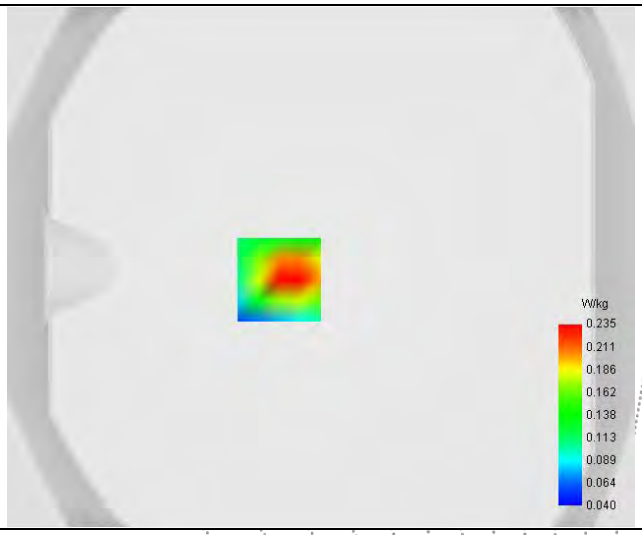
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.81
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 5
Signal	LTE FDD
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permitivity

Frequency (MHz)	829.000
Relative permitivity (real part)	43.049
Relative permitivity (imaginary part)	19.407
Conductivity (S/m)	0.879

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

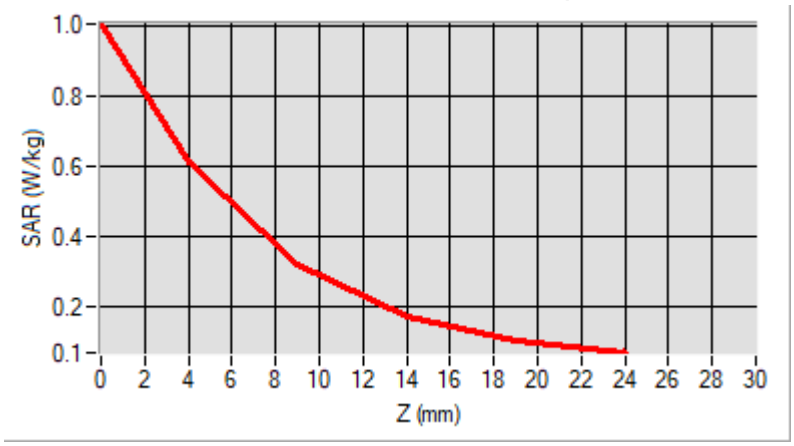
Maximum location: X=-17.00, Y=10.00 ; SAR Peak: 1.05 W/kg

D. SAR 1g & 10g

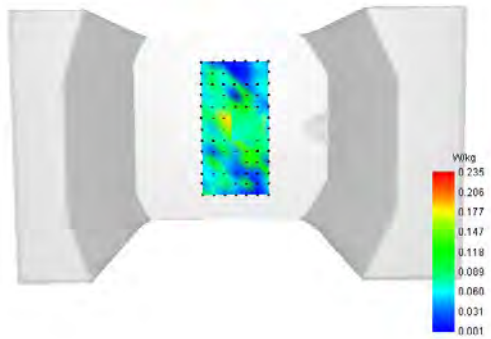
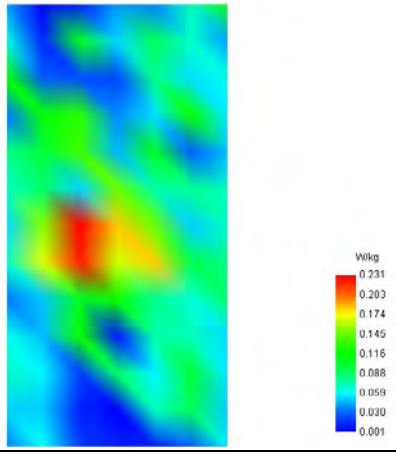
SAR 10g (W/Kg)	0.289
SAR 1g (W/Kg)	0.586
Variation (%)	2.880
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.007	0.611	0.318	0.171	0.103



F. 3D Image

3D screen shot	Hot spot position
	

Plot 12
Date of measurement: 18/2/2025

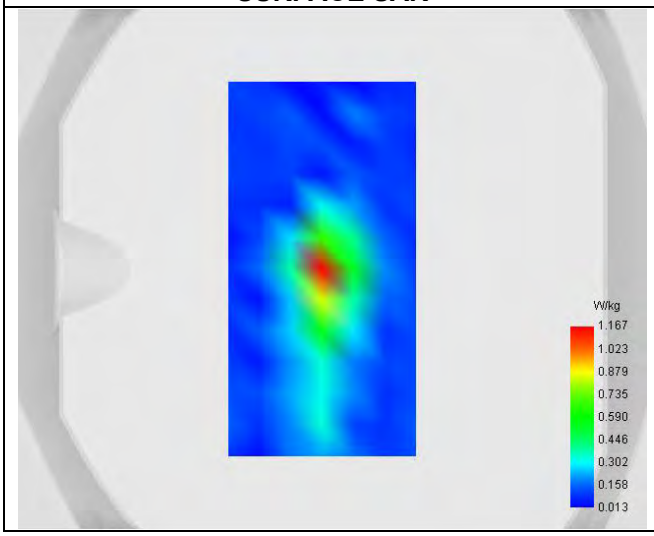
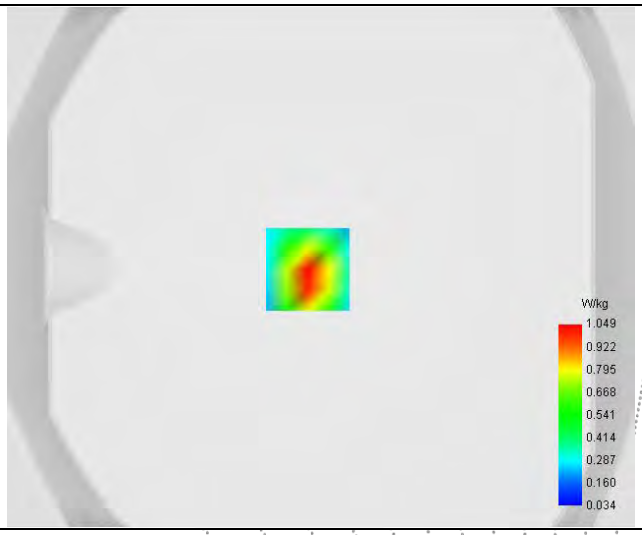
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.11
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 7
Signal	LTE FDD
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permitivity

Frequency (MHz)	2535.000
Relative permitivity (real part)	38.235
Relative permitivity (imaginary part)	13.345
Conductivity (S/m)	1.971

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

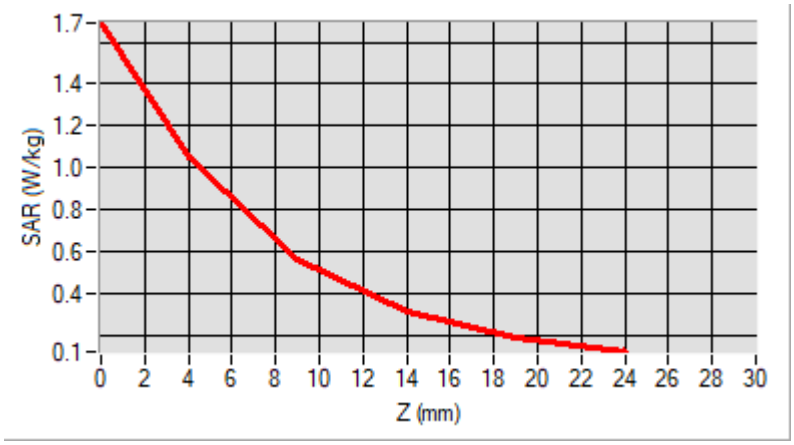
Maximum location: X=-5.00, Y=-1.00 ; SAR Peak: 1.81 W/kg

D. SAR 1g & 10g

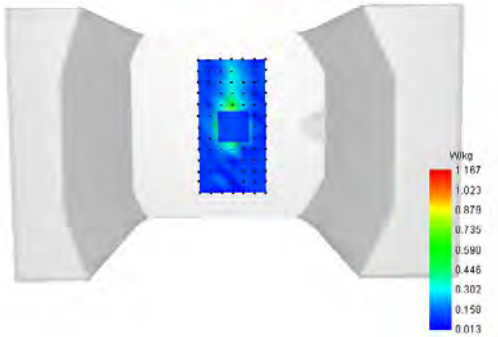
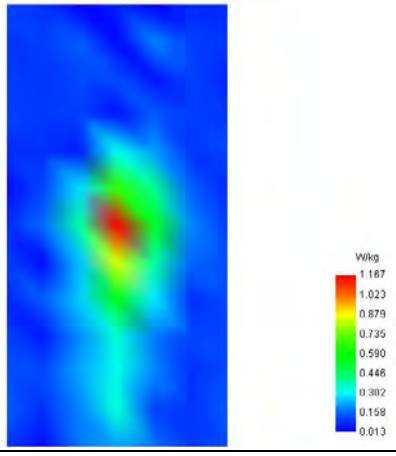
SAR 10g (W/Kg)	0.497
SAR 1g (W/Kg)	0.792
Variation (%)	-0.290
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.691	1.049	0.565	0.315	0.194



F. 3D Image

3D screen shot	Hot spot position
	

Plot 13
Date of measurement: 18/2/2025

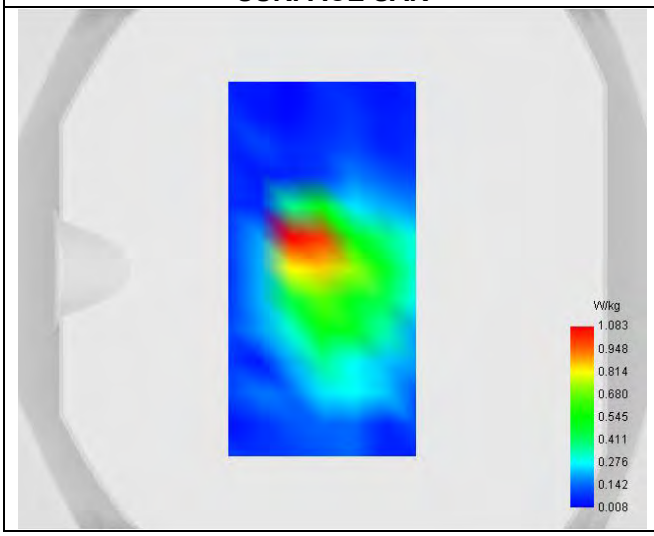
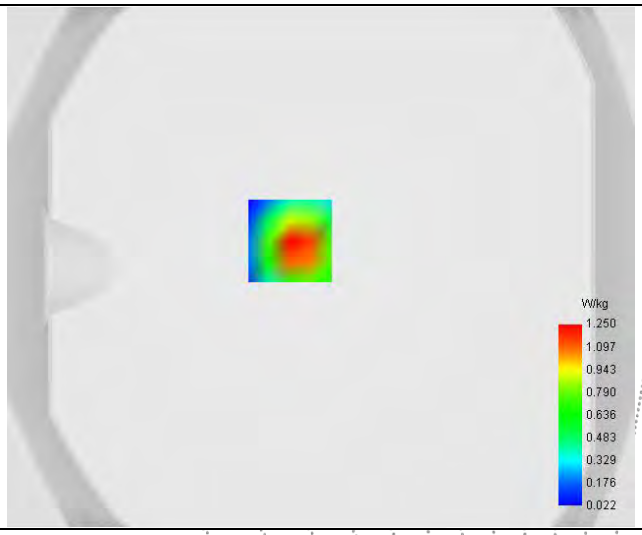
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.80
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 12
Signal	LTE FDD
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permitivity

Frequency (MHz)	711.000
Relative permitivity (real part)	40.472
Relative permitivity (imaginary part)	23.188
Conductivity (S/m)	0.900

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

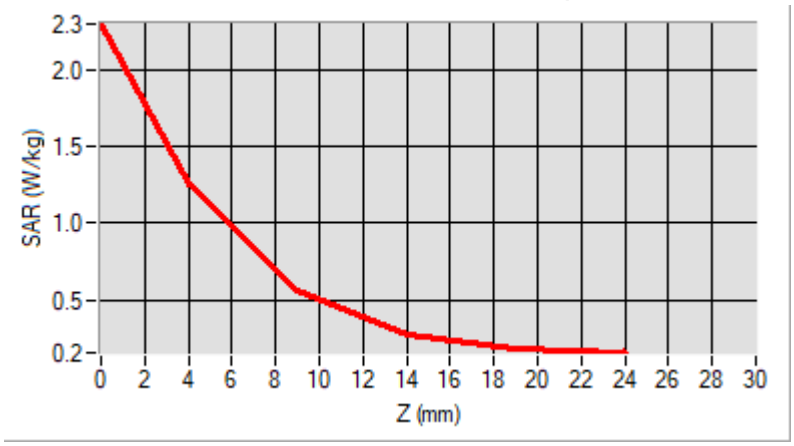
Maximum location: X=-12.00, Y=10.00 ; SAR Peak: 2.38 W/kg

D. SAR 1g & 10g

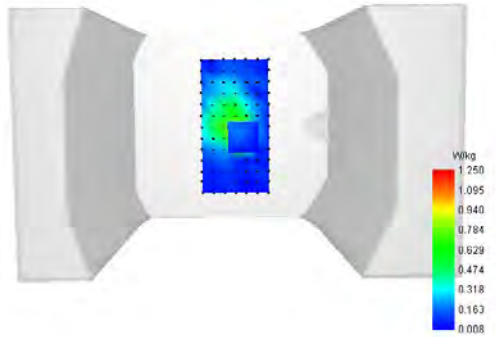
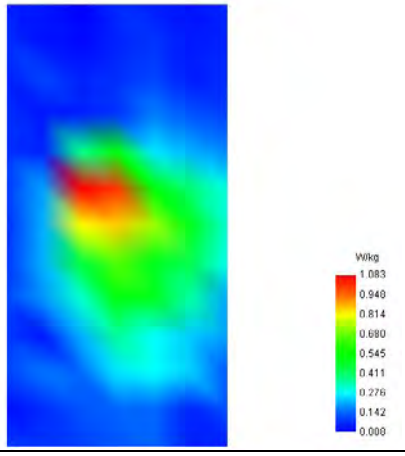
SAR 10g (W/Kg)	0.561
SAR 1g (W/Kg)	0.935
Variation (%)	1.720
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	2.293	1.250	0.562	0.279	0.187



F. 3D Image

3D screen shot	Hot spot position
	

Plot 14

Date of measurement: 18/2/2025

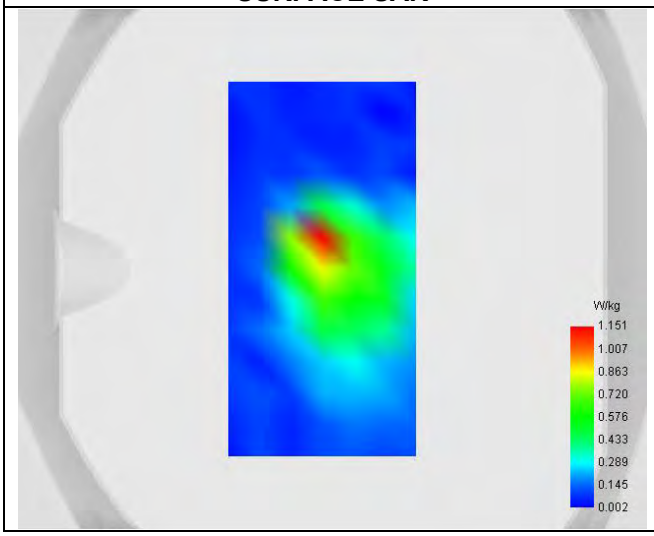
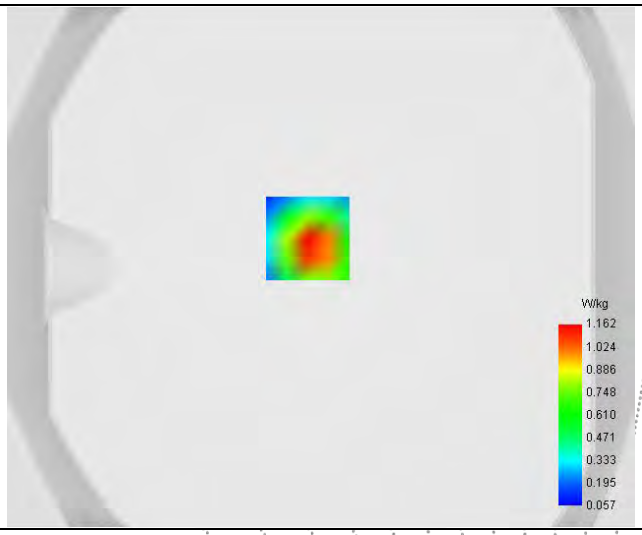
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.80
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 17
Signal	LTE FDD
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permitivity

Frequency (MHz)	709.000
Relative permitivity (real part)	40.472
Relative permitivity (imaginary part)	23.277
Conductivity (S/m)	0.900

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

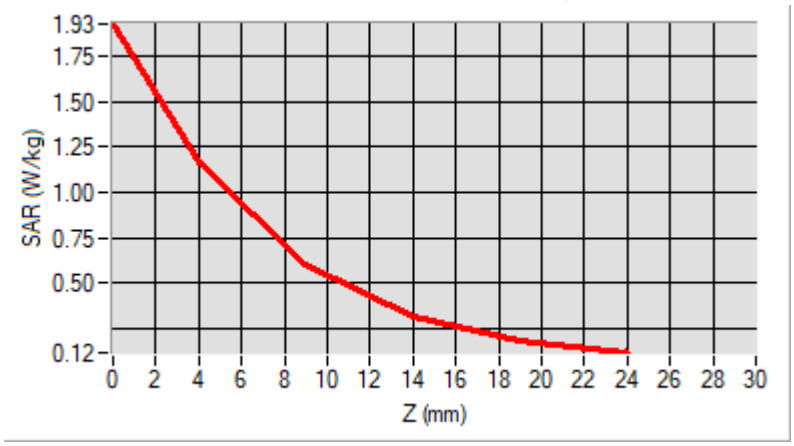
Maximum location: X=-5.00, Y=11.00 ; SAR Peak: 1.99 W/kg

D. SAR 1g & 10g

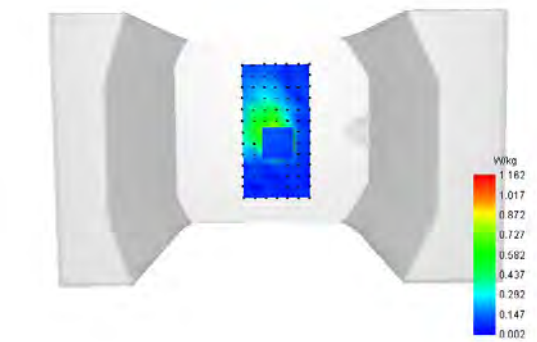
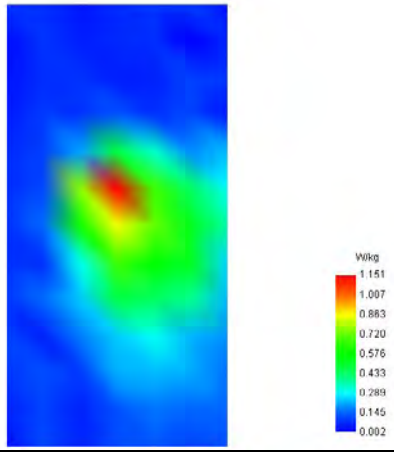
SAR 10g (W/Kg)	0.572
SAR 1g (W/Kg)	1.131
Variation (%)	-1.180
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.927	1.162	0.599	0.316	0.186



F. 3D Image

3D screen shot	Hot spot position
	

Plot 15

Date of measurement: 24/3/2025

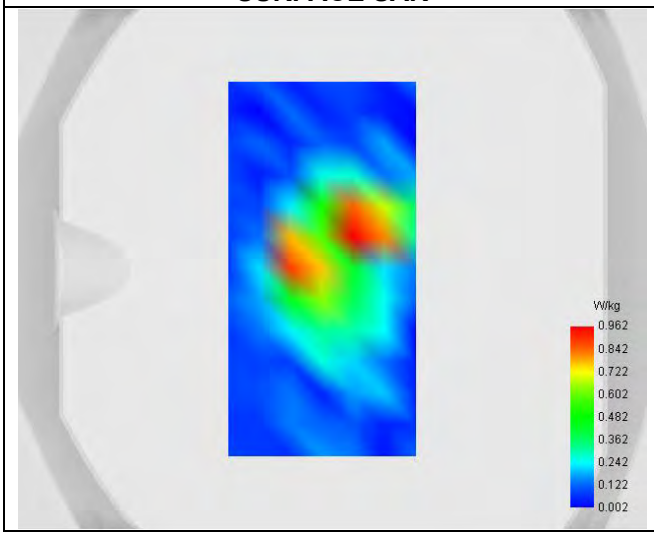
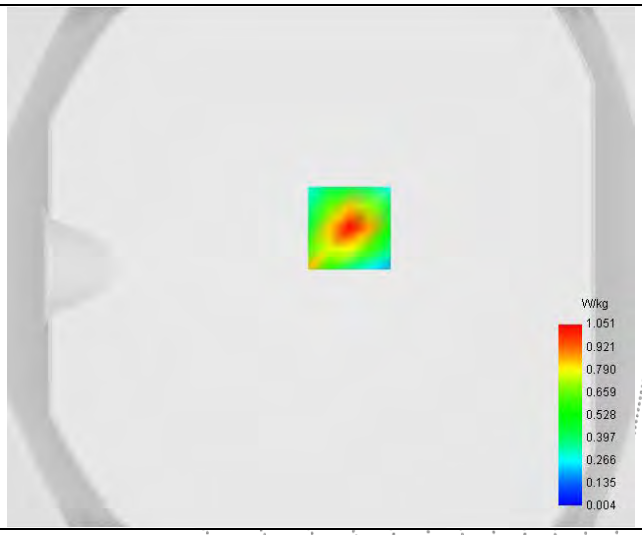
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.04
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 25
Signal	LTE FDD
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permitivity

Frequency (MHz)	1860.000
Relative permitivity (real part)	38.492
Relative permitivity (imaginary part)	13.270
Conductivity (S/m)	1.402

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

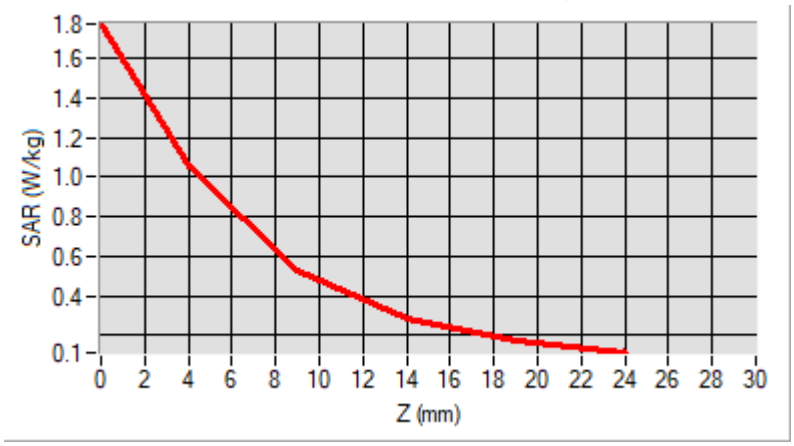
Maximum location: X=11.00, Y=15.00 ; SAR Peak: 1.77 W/kg

D. SAR 1g & 10g

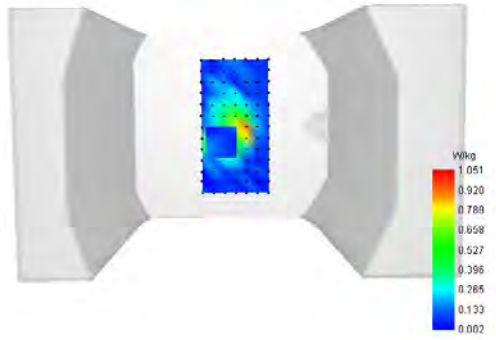
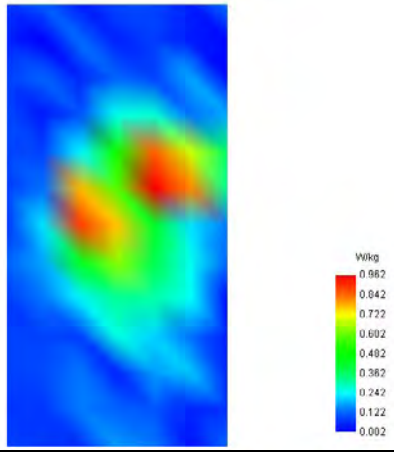
SAR 10g (W/Kg)	0.458
SAR 1g (W/Kg)	0.856
Variation (%)	-2.820
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.772	1.051	0.531	0.280	0.169



F. 3D Image

3D screen shot	Hot spot position
	

Plot 16
Date of measurement: 25/2/2025

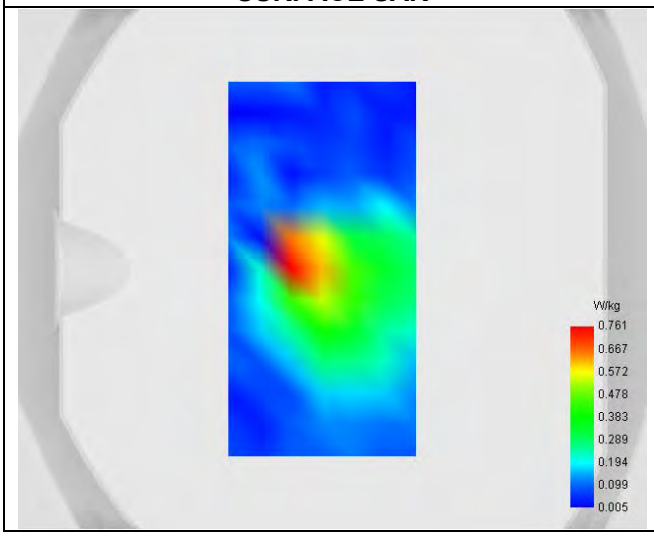
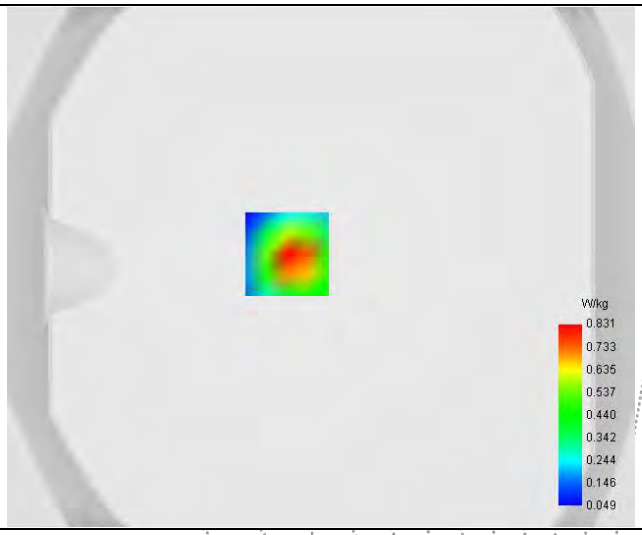
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.81
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 26
Signal	LTE FDD
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permitivity

Frequency (MHz)	819.000
Relative permitivity (real part)	43.049
Relative permitivity (imaginary part)	19.810
Conductivity (S/m)	0.879

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

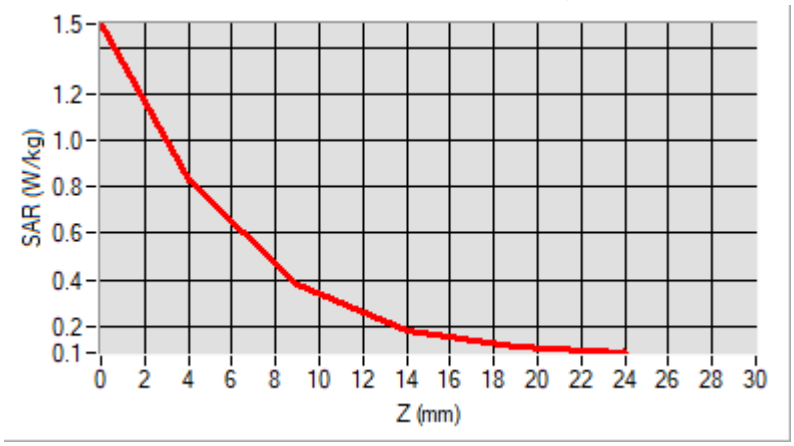
Maximum location: X=-13.00, Y=5.00 ; SAR Peak: 1.52 W/kg

D. SAR 1g & 10g

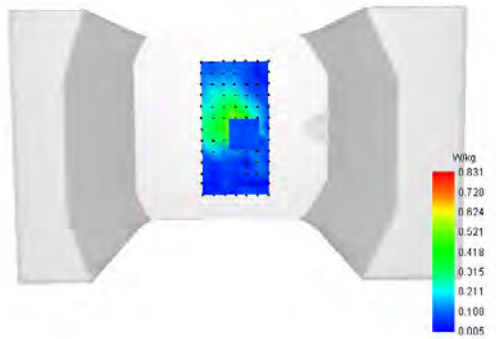
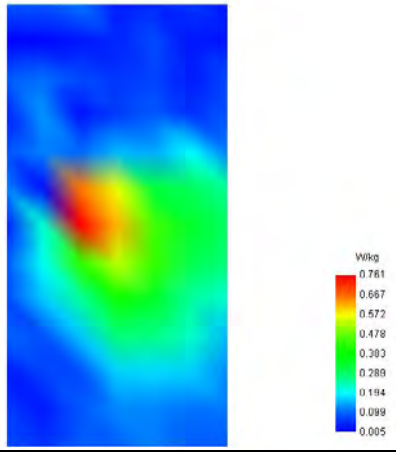
SAR 10g (W/Kg)	0.375
SAR 1g (W/Kg)	0.822
Variation (%)	-3.910
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.502	0.831	0.378	0.184	0.114



F. 3D Image

3D screen shot	Hot spot position
	

Plot 17

Date of measurement: 25/2/2025

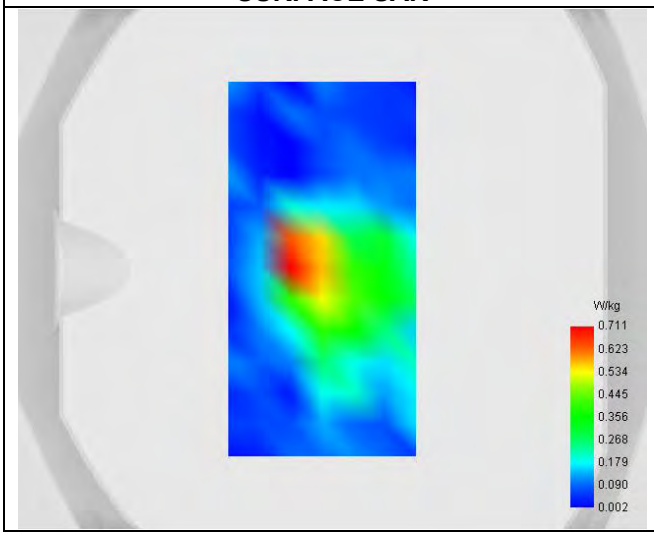
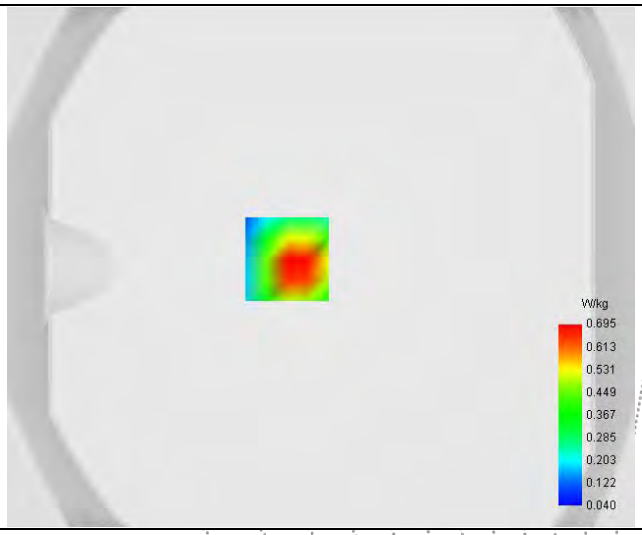
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.81
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 26
Signal	LTE FDD
Cell Bandwidth	15 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permitivity

Frequency (MHz)	836.500
Relative permitivity (real part)	43.049
Relative permitivity (imaginary part)	19.459
Conductivity (S/m)	0.879

C. SAR Surface and Volume

SURFACE SAR	**VOLUME SAR**
	

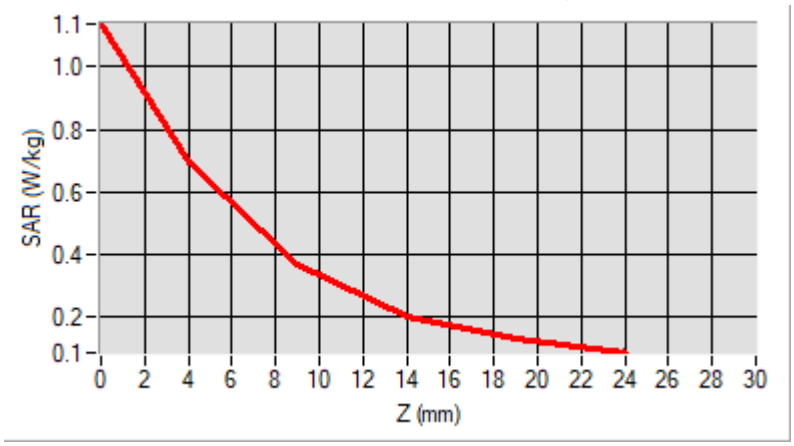
Maximum location: X=-13.00, Y=3.00 ; SAR Peak: 1.22 W/kg

D. SAR 1g & 10g

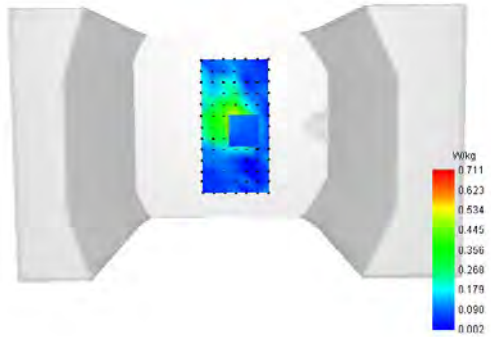
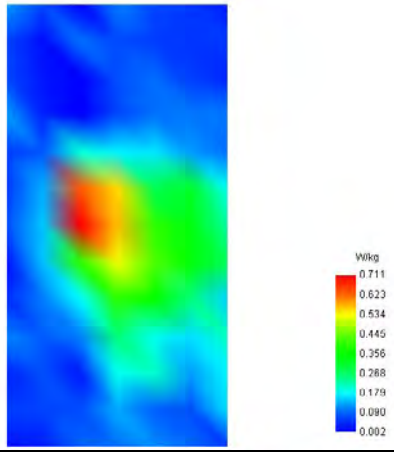
SAR 10g (W/Kg)	0.335
SAR 1g (W/Kg)	0.683
Variation (%)	-1.130
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.138	0.695	0.367	0.202	0.125



F. 3D Image

3D screen shot	Hot spot position
	

16 CALIBRATION CERTIFICATES

Probe-EPGO420 Calibration Certificate
SID750Dipole Calibration Ceriticate
SID835Dipole Calibration Ceriticate
SID1800Dipole Calibration Ceriticate
SID1900Dipole Calibration Ceriticate
SID2600Dipole Calibration Ceriticate
SID5000Dipole Calibration Ceriticate

COMOSAR E-Field Probe Calibration Report

Ref : ACR.199.1.24.BES.A

SHENZHEN BCTC TECHNOLOGY CO., LTD.
1 ~2/ F, NO. B FACTORY BUILDING, PENGZHOU INDUSTRIAL PARK, FUYUAN 1ST ROAD, TANGWEI COMMUNITY, FUHAI STREET, BAO'AN DISTRICT, SHENZHEN, GUANGDONG,CHINA

MVG COMOSAR DOSIMETRIC E-FIELD PROBE

SERIAL NO.: 2623-EPGO-420

Calibrated at MVG
Z.I. de la pointe du diable
Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE

Calibration date: 7/18/2024

Accreditations #2-6789
Scope available on www.cofrac.fr

Summary:

This document presents the method and results from an accredited COMOSAR Dosimetric E-Field Probe calibration performed at MVG, using the CALIPROBE test bench, for use with a MVG COMOSAR system only. The test results covered by accreditation are traceable to the International System of Units (SI).

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COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.199.1.24.BES.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Cyrille ONNEE	Measurement Responsible	7/18/2024	
Checked & approved by:	Jérôme Luc	Technical Manager	7/18/2024	
Authorized by:	Yann Toutain	Laboratory Director	7/18/2024	

Yann Toutain ID Signature numérique de Yann Toutain ID Date : 2024.07.18 10:38:49 +02'00'

	Customer Name
Distribution :	Shenzhen BCTC Technology Co., Ltd.

Issue	*Name*	*Date*	*Modifications*
A	Cyrille ONNEE	7/18/2024	Initial release

TABLE OF CONTENTS

1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE2
Serial Number	2623-EPGO-420
Product Condition (new / used)	New
Frequency Range of Probe	0.15 GHz-7.5GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.228 MΩ Dipole 2: R2=0.238 MΩ Dipole 3: R3=0.230 MΩ

2 PRODUCT DESCRIPTION

2.1 GENERAL INFORMATION

MVG's COMOSAR E field Probes are built in accordance to the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards.

Figure 1 – *MVG COMOSAR Dosimetric E field Probe*

Probe Length	330 mm
Length of Individual Dipoles	24.5 mm
Maximum external diameter	8 mm
Probe Tip External Diameter	2.55 mm
Distance between dipoles / probe extremity	12.7 mm

3 MEASUREMENT METHOD

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards provide recommended practices for the probe calibrations, including the performance characteristics of interest and methods by which to assess their effect. All calibrations / measurements performed meet the fore-mentioned standards.

3.1 SENSITIVITY

The sensitivity factors of the three dipoles were determined using a two step calibration method (air and tissue simulating liquid) using waveguides as outlined in the standards for frequency range 600-7500MHz and using the calorimeter cell method (transfer method) as outlined in the standards for frequency 150-450 MHz.

3.2 LINEARITY

The evaluation of the linearity was done in free space using the waveguide, performing a power sweep to cover the SAR range 0.01W/kg to 100W/kg.

3.3 ISOTROPY

The axial isotropy was evaluated by exposing the probe to a reference wave from a standard dipole with the dipole mounted under the flat phantom in the test configuration suggested for system validations and checks. The probe was rotated along its main axis from 0 to 360 degrees in 15-degree steps. The hemispherical isotropy is determined by inserting the probe in a thin plastic box filled with tissue-equivalent liquid, with the plastic box illuminated with the fields from a half wave dipole. The dipole is rotated about its axis (0°–180°) in 15° increments. At each step the probe is rotated about its axis (0°–360°).

3.4 BOUNDARY EFFECT

The boundary effect is defined as the deviation between the SAR measured data and the expected exponential decay in the liquid when the probe is oriented normal to the interface. To evaluate this effect, the liquid filled flat phantom is exposed to fields from either a reference dipole or waveguide. With the probe normal to the phantom surface, the peak spatial average SAR is measured and compared to the analytical value at the surface.

The boundary effect uncertainty can be estimated according to the following uncertainty approximation formula based on linear and exponential extrapolations between the surface and $d_{be} + d_{step}$ along lines that are approximately normal to the surface:

$$\mathrm{SAR}_{\mathrm{uncertainty}}[\%] = \delta\mathrm{SAR}_{be}\,\frac{(d_{be}+d_{step})^2}{2d_{step}}\,\frac{\left(e^{-d_{be}/(\delta/2)}\right)}{\delta/2} \quad \text{for } (d_{be}+d_{step}) < 10\ \mathrm{mm}$$

where

$\mathrm{SAR}_{\mathrm{uncertainty}}$	is the uncertainty in percent of the probe boundary effect
d_{be}	is the distance between the surface and the closest *zoom-scan* measurement point, in millimetre
Δ_{step}	is the separation distance between the first and second measurement points that are closest to the phantom surface, in millimetre, assuming the boundary effect at the second location is negligible
δ	is the minimum penetration depth in millimetres of the head tissue-equivalent liquids defined in this standard, i.e., $\delta \approx 14$ mm at 3 GHz;
$\Delta\mathrm{SAR}_{be}$	in percent of SAR is the deviation between the measured SAR value, at the distance d_{be} from the boundary, and the analytical SAR value.

The measured worst case boundary effect SARuncertainty[%] for scanning distances larger than 4mm is 1.0% Limit ,2%).

4 MEASUREMENT UNCERTAINTY

The guidelines outlined in the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards were followed to generate the measurement uncertainty associated with a SAR probe calibration using the waveguide or calorimetric cell technique depending on the frequency.

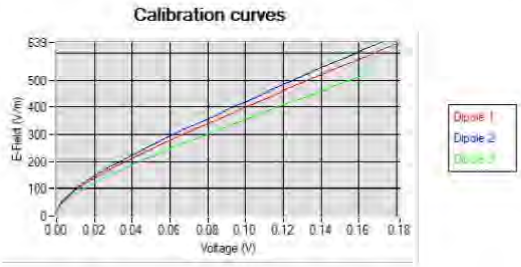
The estimated expanded uncertainty (k=2) in calibration for SAR (W/kg) is +/-11% for the frequency range 150-450MHz.
The estimated expanded uncertainty (k=2) in calibration for SAR (W/kg) is +/-14% for the frequency range 600-7500MHz.

5 CALIBRATION RESULTS

Ambient condition	
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

5.1 CALIBRATION IN AIR

The following curve represents the measurement in waveguide of the voltage picked up by the probe toward the E-field generated inside the waveguide.



From this curve, the sensitivity in air is calculated using the below formula.

$$E^2 = \sum_{i=1}^{3} \frac{V_i \left(1 + {V_i}/{DCP_i}\right)}{Norm_i}$$

where
Vi=voltage readings on the 3 channels of the probe
DCPi=diode compression point given below for the 3 channels of the probe
Normi=dipole sensitivity given below for the 3 channels of the probe

Normx dipole 1 (μV/(V/m)^2)	Normy dipole 2 (μV/(V/m)^2)	Normz dipole 3 (μV/(V/m)^2)
1.21	1.09	1.56

DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
106	109	103

5.2 CALIBRATION IN LIQUID

The calorimeter cell or the waveguide is used to determine the calibration in liquid using the formula below.

$$ConvF = \frac{E^2_{liquid}}{E^2_{air}}$$

The E-field in the liquid is determined from the SAR measurement according to the below formula.

$$E^2_{liquid} = \frac{\rho\, SAR}{\sigma}$$

where
σ=the conductivity of the liquid
ρ=the volumetric density of the liquid
SAR=the SAR measured from the formula that depends on the setup used. The SAR formulas are given below

For the calorimeter cell (150-450 MHz), the formula is:

$$SAR = c\frac{dT}{dt}$$

where
c=the specific heat for the liquid
dT/dt=the temperature rises over the time

For the waveguide setup (600-75000 MHz), the formula is:

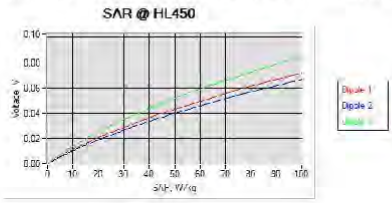
$$SAR = \frac{4P_W}{ab\delta} e^{\frac{-2z}{\delta}}$$

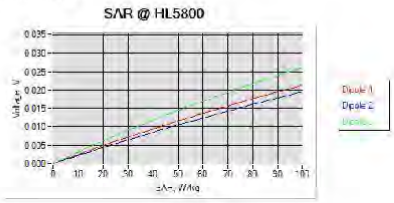
where
a=the larger cross-sectional of the waveguide
b=the smaller cross-sectional of the waveguide
δ=the skin depth for the liquid in the waveguide
Pw=the power delivered to the liquid

The below table summarize the ConvF for the calibrated liquid. The curves give examples for the measured SAR depending on the voltage in some liquid.

Liquid	Frequency (MHz*)	ConvF
HL450	450	0.86
BL450	450	0.78
HL750	750	0.80
BL750	750	0.87
HL850	835	0.81
BL850	835	0.80
HL900	900	0.76
BL900	900	0.87
HL1800	1800	0.96
BL1800	1800	1.01
HL1900	1900	1.04
BL1900	1900	1.11
HL2100	2100	1.00
BL2100	2100	1.16
HL2300	2300	1.11
BL2300	2300	1.23
HL2450	2450	1.11
BL2450	2450	1.32
HL2600	2600	1.03
BL2600	2600	1.19
HL5200	5200	1.18
BL5200	5200	0.97
HL5400	5400	1.17
BL5400	5400	1.00
HL5600	5600	1.20
BL5600	5600	0.95
HL5800	5800	1.15
BL5800	5800	1.05

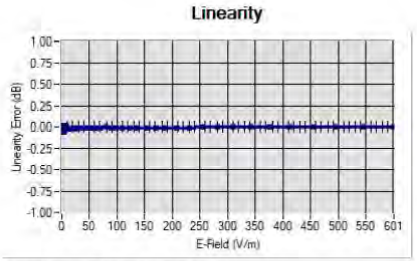
(*) Frequency validity is +/-50MHz below 600MHz, +/-100MHz from 600MHz to 6GHz and +/-700MHz above 6GHz



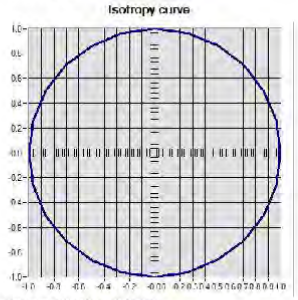


6 VERIFICATION RESULTS

The figures below represent the measured linearity and axial isotropy for this probe. The probe specification is +/-0.2 dB for linearity and +/-0.15 dB for axial isotropy.



Linearity:+/-1.48% (+/-0.06dB)



Isotropy: +/-0.25% (+/-0.01dB)

7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Descriptio	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
CALIPROBE Test Bench	Version 2	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2024	08/2027
Network Analyzer	Agilent 8753ES	MY40003210	10/2023	10/2027
Network Analyzer – Calibration kit	HP 85033D	3423A08186	06/2021	06/2027
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2025
Multimeter	Keithley 2000	4013982	02/2023	02/2026
Signal Generator	Rohde & Schwarz SMB	106589	03/2022	03/2025
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2024	06/2027
Power Meter	Keysight U2000A	SN: MY62340002	10/2022	10/2025
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Fluoroptic Thermometer	LumaSense Luxtron 812	94264	09/2022	09/2025
Coaxial cell	MVG	SN 32/16 COAXCELL_	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG2_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_0G600_	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG4_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_0G900_	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG6_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_1G500_	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG8_1	Validated. No cal required.	Validated. No cal required.

Liquid transition	MVG	SN 32/16 WGLIQ_1G800B_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_1G800H_	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG10_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_3G500_	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG12_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_5G000_	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG14_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_7G000_1	Validated. No cal required.	Validated. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2024	06/2027

SAR Reference Dipole Calibration Report

Ref : ACR.329.8.24.BES.A

SHENZHEN BCTC TECHNOLOGY CO., LTD.
1 ~2/ F, NO. B FACTORY BUILDING, PENGZHOU INDUSTRIAL PARK, FUYUAN 1ST ROAD, TANGWEI COMMUNITY, FUHAI STREET, BAO'AN DISTRICT, SHENZHEN, GUANGDONG,CHINA
MVG COMOSAR REFERENCE DIPOLE
FREQUENCY: 750 MHZ
SERIAL NO.: SN 47/21 DIP 0G750-620

Calibrated at MVG
Z.I. de la pointe du diable
Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE

Calibration date: 11/25/2024

Accreditations #2-6789 and#2-6814
Scope available on www.cofrac.fr

Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in MVG using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

Page: 1/13

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.329.8.24.BES.A

	Name	Function	Date	Signature
Prepared by :	Jérôme Luc	Technical Manager	11/25/2024	
Checked by :	Jérôme Luc	Technical Manager	11/25/2024	
Approved by :	Yann Toutain	Laboratory Director	11/25/2024	Yann TOUTAIN 2024.11.25 11:51:55 +01'00'

	Customer Name
Distribution :	Shenzhen BCTC Technology Co., Ltd.

Issue	Name	Date	Modifications
A	Jérôme Luc	11/25/2024	Initial release

TABLE OF CONTENTS

1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 750 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID750
Serial Number	SN 47/21 DIP 0G750-620
Product Condition (new / used)	New

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

MVG's COMOSAR Validation Dipoles are built in accordance to the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards. The product is designed for use with the COMOSAR test bench only.

Figure 1 – *MVG COMOSAR Validation Dipole*

4 MEASUREMENT METHOD

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

4.2 MECHANICAL REQUIREMENTS

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards specify the mechanical components and dimensions of the validation dipoles, with the dimension's frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness. A direct method is used with a ISO17025 calibrated caliper.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.08 LIN

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
0 - 300	0.20 mm
300 - 450	0.44 mm

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards were followed to generate the measurement uncertainty for validation measurements.